

**EXHIBIT 6**

# Trends in Energy Intake in U.S. between 1977 and 1996: Similar Shifts Seen across Age Groups

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## Abstract

NIELSEN, SAMARA JOY, ANNA MARIA SIEGA-RIZ, AND BARRY M. POPKIN. Trends in energy intake in U.S. between 1977 and 1996: similar shifts seen across age groups. *Obes Res.* 2002;10:370–378.

**Objective:** To determine the trends in locations and food sources of Americans stratified by age group for both total energy and the meal and snack subcomponents.

**Research Methods and Procedures:** Nationally representative data was taken from the 1977 to 1978 Nationwide Food Consumption Survey and the 1989 to 1991 and 1994 to 1996 (and 1998 for children age 2 through 9) Continuing Surveys of Food Intake by Individuals. The sample consisted of 63,380 individuals, age 2 and up. For each survey year, the percentage of total energy intake from meals and snacks was calculated separately for 2- to 18-year-olds, 19- to 39-year-olds, 40- to 59-year-olds, and those 60 years and older. The percentage of energy intake by location (at-home consumption or preparation, vending, store eaten out, restaurant/fast-food, and school) and by specific food group was computed for all age groups separately.

**Results:** The trends in location and food sources were almost identical for all age groups. Key dietary behavior shifts included greater away-from-home consumption; large increases in total energy from salty snacks, soft drinks, and pizza; and large decreases in energy from low- and medium-fat milk and medium- and high-fat beef and pork.

**Discussion:** Total energy intake has increased over the past 20 years, with shifts away from meals to snacks and from at-home to away-from-home consumption. The similarity of changes across all age groups furthers the assertion that

broad-based environmental changes are needed to improve the diets of Americans.

**Key words:** dietary trends, food sources, locations, fast-food, restaurants, total energy

## Introduction

The rapid increase in obesity across all age groups, coupled with reductions in the age when obesity comorbidities emerge, force us to focus on the overall American diet for individuals of all ages (1–3). During this time of rising prevalence in obesity, the levels of physical activity have decreased, and important shifts in diet have occurred (4). Americans have increased their consumption of sugars and energy-dense foods (5). Some of these shifts may be explained by the fact that people are obtaining a greater percentage of their food outside the home, specifically from restaurant and fast-food places (6–9). The largest increases in types of food consumed mirror the shifts in consumption from at home to away from home (10,11). These shifts include increased intakes of salty snacks, soft drinks, and pizza (12,13).

Although there have been many studies that looked at various components of the American diet as well as at selected age groupings, there have been no studies that looked solely at total energy intake or at all age groups in one analysis. Furthermore, we lack information on whether similar shifts across the age groups have occurred. It is important to examine total energy intake because certain scholars feel that there is a continually increasing amount of energy being consumed by Americans over the past 20 years (13,14). We investigated energy intake trends among much of the American population by looking at the ages broken into broad age categories: children 2 to 18 years old, young adults 19 to 39 years old, middle-aged adults 40 to 59 years old, and older adults (hereafter termed elderly) age 60 and up. The use of age-adjusted results allowed us to assess trends explained by changes in eating behavior. This study focuses on the shifts in energy intake related to eating

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location and the concurrent changes in consumption of certain key food items between 1977 and 1996.

## Research Methods and Procedures

### *Survey Design and Sample*

This study used data on subjects age 2 years and above from four nationally representative surveys of the U.S. population. Of the 63,380 individuals, 29,695 participated in the 1977 to 1978 (hereafter referred to as 1977) Nationwide Food Consumption Survey (NFCS77), 14,658 participated in the 1989 to 1991 (hereafter referred to as 1989) Continuing Survey of Food Intake by Individuals (CSFII89), and 19,027 participated in the 1994 to 1996 (hereafter referred to as 1996) Continuing Survey of Food Intake by Individuals (CSFII96). This last survey also included a sample of children age 2 to 9 surveyed in 1998. The United States Department of Agriculture (USDA) surveys from 1977 and 1989 contained stratified area probability samples of non-institutionalized U. S. households in the 48 contiguous states and, in 1996, all 50 states. These surveys were self-weighting, multistage, stratified area samples of the U.S. population. Detailed information pertaining to each survey has been previously published (15–17).

The NFCS77 and CSFII89 surveys collected information on 1 day of intake by an in-home, interviewer-administered 24-hour recall and 2 additional days of self-administered 1-day food records. The CSFII96 collected two non-consecutive, interviewer-administered 24-hour recalls by phone ~10 days apart.

For each food consumed in all four surveys, the respondent was asked whether this eating occasion was a meal or snack. The respondent was also asked where the food was obtained; if the food was bought in a store, then it was determined whether the food was eaten at home or whether the food was ever brought into the home. This led to the classification of food sources as either from a vending machine, eaten or prepared at home, from a store but not eaten or ever brought into the home (called store eaten out), from a fast-food establishment or restaurant (called restaurant/fast-food), from a school (termed school), or as a gift from someone or any other source. Aside from food that was bought from a store, food from any other source was considered to be from that source, even if brought into the home. For example, if someone ordered pizza from a pizza place or picked up fast-food on the way home and ate it in the home, that food was still considered to be part of the restaurant/fast-food category.

To examine the thousands of foods contributing to energy intake, the University of North Carolina-Chapel Hill food-grouping system was used. This system aggregates all the foods in the USDA nutrient composition tables into 74 descriptive and nutrient-based subgroups. In addition, selected popular foods such as pizza, hamburger, and french

fries were also identified to examine trends in intake of these foods over time. These foods were identified in a previous paper to examine trends in fat intake (18). It should be noted that the individual food entries actually represent a large number of foods and food codes from the food table.

### *Statistical Analysis*

Descriptive statistics were generated for selected sociodemographic variables of interest, weighted and controlled for sample design effects with STATA 7 (Table 1). Significance testing was done on the sociodemographic variables with a *z* statistic to test the difference between two proportions. The USDA data contained each food item a person consumed, along with the self-reported eating occasion and self-reported place where food was obtained and eaten. Once foods were categorized by eating occasion (snacks vs. non-snack meals), the average energy (in kilocalories) and the percentage of energy contributed by snacks and non-snacks (meals) was computed for each survey year by age group. Then, for each survey year, the average percentage of energy consumed from selected snack food categories (salty snacks, desserts, candy, soft drinks, fruit drinks, and alcohol) and other selected food groups (pizza, Mexican, etc.) as well as the location (at home, vending, store eaten out, restaurant/fast-food, and school) were determined separately for each age group: 2- to 18-year-olds, 19- to 39-year-olds, 40- to 59-year-olds, and those 60 years and older. These results were adjusted by age, sex, education level, ethnicity, region of the country, urban classification, household size, and poverty level (<185% and >350% of national level). To test for statistical differences, SAS 8.1 (SAS Institute, Cary, NC) and SUDAAN 7.5.6 (Research Triangle Institute, Research Triangle Park, NC) software packages were used; this also allowed for weights and control of sample design effects. A value of  $p \leq 0.01$  was used to denote statistical significance.

In addition, the same age breakdowns for food location and food sources were examined for sex, race, education, and income for meaningful trends. To explore overall trends and the role of age, we also examined the total amount of calories obtained across the population from a specific location or a key food item. The proportion of the population in each age group in 1980 was multiplied by the mean percentage of energy from each of the elements, thereby weighting the total energy for location or food group by the distribution of the population. This allowed us to look at our results and take into account one of the possible biases that would affect our data.

## Results

### *Total Energy Percentages by Location*

Between 1977 and 1996, Americans increased the proportion of total energy obtained from restaurants and fast-food establishments and decreased the proportion from

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**Table 1.** Percentages of population by sociodemographic characteristics, 1977 to 1996

	1977	1989	1994
<b>Sociodemographic characteristics</b>			
Age 2 to 18 years	31.0%*†	26.1%*	26.0%‡
Age 13 to 39 years	31.7%*	34.8%*	33.5%
Age 40 to 59 years	22.1%†	22.2%	24.3%†
Age 60+ years	15.2%	16.8%	16.2%
Total (n)	29,695	14,658	19,027
Male	44.0%*†	47.9%*	48.8%†
Non-Hispanic white	80.3%†	77.4%	72.9%†
Non-Hispanic black	12.6%	11.9%	12.5%
Hispanic	5.8%†	8.2%	10.4%†
Other	1.3%*†	2.5%*‡	4.3%†‡
<b>Poverty level</b>			
<185% of national level	32.1%	28.2%	30.6%
>350% of national level	30.6%*†	41.6%*	39.3%†
Northeast	24.5%*	20.7%*	19.7%
Midwest	26.4%	24.3%	23.5%
South	31.2%	34.6%	34.9%
West	17.9%	20.4%	21.9%
Central cities	30.0%	30.1%	31.5%
Suburban	37.7%*†	47.6%*	47.2%†
Non-metropolitan	32.3%*†	22.3%*	21.3%†
<b>Low education level</b>			
12 years of education or less	70.3%*†	55.5%*	51.6%†
<b>Mean household size</b>			
	3.9*†	3.4*	3.4†

p ≤ 0.01.

\* Significant difference between 1977 to 1978 and 1989 to 1991.

† Significant difference between 1977 to 1978 and 1994 to 1996.

‡ Significant difference between 1989 to 1991 and 1994 to 1996.

home. Energy intake from foods eaten at home decreased by between 11.1% and 20.8% for all age groups from 1977 to 1996. Energy intake from restaurant/fast-food increased by between 91.2% and 208% for all age groups. There was little or no change (13.5% to 34.2%) in the amount of energy obtained from the store-eaten-out category (this only accounts for, at most, 7.8% of the total caloric intake).

For Americans, there was a larger increase in absolute energy intake and a much larger relative increase in energy consumed as snacks, rather than meals, over the past 20 years such that snacks represented 17.7% of the average American's energy in 1996 compared with only 11.3% in 1977 (Table 2). Snacks represented a larger portion of the diets of 2- to 18-year-olds than the diets of other age groups (in 1996, >20% of their energy intake, up from 13% in 1977). Although the elderly still snacked the least, with 14.0% of their energy from snacks, they had the largest

jump in snacking, up from 7.7% in 1977. Although energy from meals has been decreasing for all age groups (down about 7.2% for the average American), the elderly had the smallest decrease in energy from meals; meals still constituted 86.1% of their diet.

There were some important age-group differences in location of consumption. The average American increased restaurant/fast-food consumption for meals from 9.6% to 23.5% between 1977 and 1996, and this represents a change between 104% and 255% per age group. Although all age groups have increased their consumption of meals from restaurants/fast-food establishments, the 19- to 39-year-olds have continued to consume the greatest percentage of restaurant/fast-food meals. In 1996, snacks from the store eaten out represented up to 12.2% of all energy from snacks, whereas meals from the store eaten out represented only up to 5.6% of all energy from meals for this age group.

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**Table 2.** Trends in energy intake by eating occasion and location (% energy)\*

	Total energy			Meals			Snacks		
	1977 to 1978	1989 to 1991	1994 to 1996	1977 to 1978	1989 to 1991	1994 to 1996	1977 to 1978	1989 to 1991	1994 to 1996
<b>Age 2 to 18 years</b>									
Vending	0.3††	0.1‡§	0.5‡§	0.2†‡	0.1†§	0.3‡§	1.1†‡	0.5†§	1.3‡§
At home	75.7††	71.1†	65.2†	75.2††	70.2†§	64.2†§	79.4††	76.4†§	69.1†§
Store/out	5.2††	1.9†§	4.5‡§	5.0†‡	1.2†§	3.2†§	6.9†	5.9§	9.3†§
Restaurant/fast-food	4.8††	14.6†§	14.8‡§	4.7††	15.4†§	16.7†§	5.7††	10.4†§	7.9†§
School	10.9††	9.8†	8.7†	12.1††	11.1†	10.2†	2.4††	2.5†§	3.0†§
Other	3.1††	2.4†§	6.3‡§	2.9††	2.1†§	5.5†§	4.3††	4.2†§	9.5†§
Total	100	100	100	100	100	100	100	100	100
Total energy (kcal)	1840††	1778†§	1958‡§	1600††	1510†§	1549†§	240††	267†§	409†§
<b>Age 19 to 39 years</b>									
Vending	1.1††	1.0†§	1.2‡§	0.7†	0.5†§	0.6§	4.4†	3.8§	4.0†§
At home	72.4†	68.4§	57.3†§	73.0††	68.3†§	56.8†§	68.1††	69.7†§	59.5†§
Store/out	7.8†	3.0†§	6.7§	7.5††	2.3†§	5.6†§	10.0††	7.5†§	12.2†§
Restaurant/fast-food	14.2††	24.0†§	28.1†§	14.6††	25.7†§	30.7†§	11.5††	12.9†§	15.7†§
School	0.5††	0.4†§	0.6†§	0.5††	0.4†§	0.6†§	0.3†	0.3§	0.3‡§
Other	4.0††	3.2†§	6.1‡§	3.7††	2.8†§	5.7†§	5.8††	5.8†§	8.2†§
Total	100	100	100	100	100	100	100	100	100
Total energy (kcal)	1856††	1940†§	2198†§	1631††	1682†§	1811†§	244††	258†§	387†§
<b>Age 40 to 59 years</b>									
Vending	0.5††	0.7†§	0.8†§	0.3††	0.4†§	0.5†§	1.9†	3	2.7†
At home	78.1††	73.9†	66.8†	78.2††	73.5†§	66.1†§	76.9††	76.5†§	70.8†§
Store/out	7.6††	2.5†§	5.0†§	7.5††	2.1†§	4.1†§	9.0†	5.1§	9.2†§
Restaurant/fast-food	11.5††	19.2†§	21.8†§	11.8††	20.7†§	24.1†§	8.5†	9.0§	10.1†§
School	0.2††	0.4†	0.4†	0.2††	0.4†	0.4†	0.2	0.4	0.4
Other	2.1††	3.2†§	5.1‡§	2.0††	2.8†§	4.8†§	3.4††	5.8†§	6.8†§
Total	100	100	100	100	100	100	100	100	100
Total energy (kcal)	1747†	1753§	1954†§	1572††	1534†§	1632†§	175††	219†§	323†§
<b>Age 60+ years</b>									
Vending	0.1††	0.1†§	0.1†§	0.0††	0.0†§	0.1†§	0.3††	0.6†	0.5†
At home	88.5††	84.2†§	78.7†§	88.4††	84.1†§	78.0†§	90.1††	84.5†§	83.2†§
Store/out	3.4††	1.2†§	2.4†§	3.3††	1.1†§	2.2†§	4.8††	2.7†§	3.9†§
Restaurant/fast-food	5.3††	11.8†§	13.9†§	5.5††	12.5†§	15.3†§	2.4††	5.7†§	5.2†§
School	0.5††	0.0†§	0.2†§	0.6††	0.0†§	0.2†§	0.0††	0.0†§	0.1†§
Other	2.1††	2.7†§	4.7†§	2.1†	2.2§	4.3†§	2.3††	6.5†§	7.1†§
Total	100	100	100	100	100	100	100	100	100
Total energy (kcal)	1619†	1574†§	1633§	1495††	1412†	1406†	125††	162†§	228†§
<b>All Americans age ≥2 years</b>									
Vending	0.6†	0.6§	0.8†§	0.4††	0.3†§	0.4‡§	2.3††	2.3†§	2.5†§
At home	76.9††	72.6†§	64.5†§	77.0††	73.3†§	63.8†§	76.0††	74.8†§	67.4†§
Store/out	6.3††	2.3†§	5.2†§	6.1††	1.8†§	4.2†§	8.2††	6.0†§	9.8†§
Restaurant/fast-food	9.4††	18.7†§	21.3†§	9.6††	20.0†§	23.5†§	7.9††	10.5†§	11.0†§
School	3.7††	2.8†	2.6†	4.1††	3.1†	2.9†	1.1†	1.0§	1.1‡§
Other	3.0†	2.9§	5.7†§	2.8††	2.5†§	5.2†§	4.5††	5.4†§	8.2†§
Total	100	100	100	100	100	100	100	100	100
Total energy (kcal)	1791†	1795§	1985†§	1588††	1559†§	1634†§	203††	236†§	351†§

\* Adjusted for age, sex, education level, ethnicity, region, urban classification, household size, and % poverty,  $p \leq 0.01$ .

† Significant difference between 1977 to 1978 and 1989 to 1991.

‡ Significant difference between 1977 to 1978 and 1994 to 1996.

§ Significant difference between 1989 to 1991 and 1994 to 1996.

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Table 3. Trends in energy intake by meal pattern type and specific food groups\*

	Total energy			Meals			Snacks		
	1977 to 1978	1989 to 1991	1994 to 1996	1977 to 1978	1989 to 1991	1994 to 1996	1977 to 1978	1989 to 1991	1994 to 1996
<b>Age 2 to 18 years</b>									
Salty snacks	2.2†‡	3.6†§	5.1§	1.4†‡	2.0†§	2.7†§	7.6†‡	13.0†§	14.2‡§
Desserts	9.8†‡	9.0†§	9.6†§	6.5†‡	5.6†	5.6†	31.2†‡	28.6§	24.9†§
Candy	1.1†‡	1.4†§	2.1§	0.3†‡	0.6†§	0.6†§	6.0†‡	6.5†§	7.8†§
Soft drinks	3.0†‡	4.0†§	5.5†§	2.2†‡	3.3†§	4.7†§	7.7†‡	7.9†§	8.3†§
Fruit drinks	1.8†‡	2.1†§	3.1§	1.6†‡	1.8†§	2.8†§	3.4†‡	3.6†§	4.1†§
Alcohol	0.1†	0.0†§	0.1§	0.0†‡	0.0†§	0.0†§	0.4†‡	0.1†§	0.3†§
French fries	1.7†‡	2.5†§	2.6†§	1.9†‡	2.8†§	3.0†§	0.5†‡	0.6†§	0.9†§
Hamburgers	0.7†‡	0.9†§	0.6†§	0.8†‡	1.0†§	0.8†§	0.3†	0.3§	0.2†§
Cheeseburgers	0.3†‡	1.2†§	1.2†§	0.3†‡	1.3†§	1.5†§	0.1†‡	0.6†	0.4†
Pizza	1.4†‡	3.2†§	3.4†§	1.4†‡	3.5†§	3.9†§	1.4†	1.3§	1.7†§
Mexican	0.4†‡	1.2†§	1.6†§	0.4†‡	1.3†§	1.8†§	0.1†‡	0.4†§	0.9†§
Low- and medium-fat milk	14.1†‡	12.0†§	9.8†§	14.2†‡	12.3†§	10.0†§	13.5†‡	10.6†§	8.8†§
Med- and high-fat beef and pork	8.9†‡	4.0†§	3.1†§	10.0†‡	4.6†§	3.8†§	1.2†‡	0.6†§	0.6†§
High-fat lunchmeats and hot dogs	2.9†‡	2.1†§	2.1†§	3.2†‡	2.4†	2.4†	1.2†‡	0.8†§	0.9†§
Other	51.7†‡	52.6†§	50.1†§	55.6†‡	57.5†	56.5†	25.4†‡	25.0†§	26.1†§
Total	100	100	100	100	100	100	100	100	100
Total energy (kcal)	1840†‡	1778†§	1958†§	1599†‡	1510†§	1549†§	240†‡	267†§	409†§
<b>Age 19 to 39 years</b>									
Salty snacks	1.8†‡	3.2†§	4.2†§	1.3†‡	2.1†§	2.5†§	5.8†‡	10.0†§	11.9†§
Desserts	7.3†‡	6.8†§	7.0†§	5.1†‡	4.2†§	4.3†§	23.8†‡	23.6†§	19.7†§
Candy	0.6†‡	0.9†§	1.3†§	0.2†‡	0.3†§	0.3†§	3.2†‡	5.3†§	5.7†§
Soft drinks	4.1†‡	5.3†§	7.0†§	3.1†‡	4.3†§	6.2†§	10.9†‡	11.7†§	10.7†§
Fruit drinks	1.0†‡	1.1†§	1.8†§	0.9†	0.9§	1.5†§	1.8†‡	1.9†§	3.0†§
Alcohol	2.6†‡	2.7†§	3.6†§	1.6†‡	1.7†§	2.1†§	10.0†‡	9.0§	10.6†§
French fries	1.7†‡	2.2†§	2.5†§	1.9†‡	2.4†§	2.9†§	0.4†‡	0.6†§	0.8†§
Hamburgers	0.9†	0.9§	1.0†§	1.0†	1.0†§	1.1†§	0.4†	0.2†§	0.2
Cheeseburgers	0.4†‡	1.6†§	1.7†§	0.4†‡	1.7†§	1.9†§	0.1†‡	0.7†§	0.7†§
Pizza	1.3†‡	3.6†	3.1†	1.3†‡	3.9†	3.4†	1.7†‡	2.0†§	1.6†§
Mexican	0.3†§	1.2†§	1.9†§	0.4†‡	1.3†§	2.1†§	0.1†‡	0.6†§	0.8†§
Low- and medium-fat milk	7.0†‡	5.9†§	4.6†§	6.8†‡	5.7†§	4.3†§	8.3†‡	6.7†§	5.9†§
Medium- and high-fat beef and pork	11.7†‡	5.3†§	4.3†§	13.1†‡	6.0†§	5.0†§	2.0†‡	0.9†§	0.9†§
High-fat lunchmeats and hot dogs	3.1†‡	1.9†§	1.9†§	3.4†‡	2.1†§	2.2†§	1.5†‡	0.9†§	0.8†§
Other	56.1†‡	57.5†§	54.2†§	59.6†‡	62.3†§	60.1†§	30.2†	25.9§	26.7†§
Total	100	100	100	100	100	100	100	100	100
Total energy (kcal)	1855†‡	1940†§	2198†§	1631†‡	1682†§	1811†§	224†‡	258†§	387†§
<b>Age 40 to 59 years</b>									
Salty snacks	1.4†‡	3.2†§	3.8†§	1.0†‡	1.9†§	3.2†§	5.3†‡	12.1†§	11.6†§
Desserts	8.3†‡	7.6†§	8.9†§	6.2†‡	5.3†§	5.5†§	27.2†‡	23.7†§	26.5†§
Candy	0.5†‡	0.8†§	1.4†§	0.2†‡	0.3†§	0.4†§	3.3†‡	4.5†§	6.6†§
Soft drinks	1.9†‡	3.3†§	4.0†§	1.5†‡	2.7†§	3.3†§	5.6†‡	8.1†§	7.7†§
Fruit drinks	0.6†‡	0.8†§	1.3†§	0.5†‡	0.7†§	1.2†§	0.9†‡	1.4†§	1.7†§
Alcohol	2.4†‡	2.9†§	2.9†§	1.5†‡	2.1†§	1.8†§	10.1†‡	8.5†§	8.2†§
French fries	1.2†‡	1.6†§	1.6†§	1.3†‡	1.8†§	1.9†§	0.1†‡	0.3†§	0.3†§
Hamburgers	0.5†‡	0.6†§	0.7†§	0.5†‡	0.7†§	0.8†§	0.3†	0.0†§	0.1§
Cheeseburgers	0.2†‡	1.0†§	0.7†§	0.2†‡	1.1†§	0.8†§	0.0†‡	0.1†§	0.2†§
Pizza	0.5†‡	2.1†§	1.7†§	0.5†‡	2.2†	1.9†	0.6†‡	1.1†§	0.5†§
Mexican	0.2†‡	0.8†§	1.2†§	0.2†‡	0.9†§	1.4†§	0.0†‡	0.1†§	0.3†§
Low- and medium-fat milk	5.4†‡	5.2†§	4.5†§	5.1†‡	4.9†§	4.3†§	8.4†‡	7.0†§	5.5†§
Medium- and high-fat beef and pork	12.7†‡	5.5†§	4.4†§	13.9†‡	6.1†§	5.1†§	1.5†‡	1.0†	0.7†

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Table 3. continued.

	Total energy			Meals			Snacks		
	1977 to 1978	1989 to 1991	1994 to 1996	1977 to 1978	1989 to 1991	1994 to 1996	1977 to 1978	1989 to 1991	1994 to 1996
High-fat lunchmeats and hot dogs	3.0†‡	2.2†	2.0‡	3.2†‡	2.4†	2.2‡	1.5†‡	0.8*§	0.9‡§
Other	61.2†‡	62.4†§	60.9‡§	64.1†‡	66.9†§	67.2‡§	35.1†‡	31.4*§	29.0†§
Total	100	100	100	100	100	100	100	100	100
Total energy (kcal)	1747†‡	1753§	1954‡§	1572†‡	1534†§	1632‡§	175†‡	219†§	323‡§
Age 60+ years									
Salty snacks	1.3†‡	1.9†§	2.6‡§	1.0†‡	1.2†§	1.4‡§	4.9†‡	8.4†§	9.5†§
Desserts	9.3†‡	8.9†§	10.4†§	7.5†‡	6.7†§	7.2‡§	30.3†‡	28.1†§	30.5†§
Candy	0.4†‡	0.6†§	0.9‡§	0.1‡	0.2§	0.2‡§	3.3†‡	4.3†§	5.3†§
Soft drinks	0.9†‡	1.6†§	1.8‡§	0.7†‡	1.3†§	1.4‡§	4.1†‡	4.7†§	4.1‡§
Fruit drinks	0.6†‡	0.8†§	1.1†§	0.5†‡	0.7†§	0.9†§	1.6†‡	1.9†§	2.2‡§
Alcohol	1.5†	1.6§	1.9†§	1.0†	0.9†§	1.2§	6.4†‡	7.7†§	6.1†§
French fries	0.8†	0.9§	1.0†§	0.9†	0.9§	1.1†§	0.1†‡	0.2†§	0.2‡§
Hamburgers	0.2†‡	0.3†§	0.3‡§	0.2†‡	0.4†§	0.4†§	0.0†‡	0.0†§	0.0†§
Cheeseburgers	0.0†‡	0.3†§	0.3†§	0.0†‡	0.4†§	0.3†§	0.0†‡	0.0†§	0.1†§
Pizza	0.2†‡	0.7†§	0.6†§	0.2†‡	0.7†§	0.6†§	0.3†‡	0.4†	0.3†§
Mexican	0.1†‡	0.3†§	0.3†§	0.1†‡	0.3†§	0.3†§	0.0	0.0	0.1
Low- and medium-fat milk	6.5†‡	6.4†§	5.6†§	6.2†‡	6.1†§	5.3†‡	10.8†‡	9.4†§	7.4‡§
Medium- and high-fat beef and pork	10.9†‡	4.5†§	3.9†§	11.7†‡	4.9†§	4.5†§	1.2†‡	0.4†§	0.4†§
High-fat lunchmeats and hot dogs	2.5†‡	1.9†§	2.0†§	2.7†‡	2.1†	2.1†	0.8†	0.5§	1.1†§
Other	64.8†‡	69.3†	67.3†	67.2†‡	73.4†§	72.9†	36.3†‡	33.9†§	32.7†§
Total	100	100	100	100	100	100	100	100	100
Total energy (kcal)	1619†	1574†§	1633§	1495†‡	1412†	1406†	125†‡	162†§	228‡§
All Americans age ≥2 years									
Salty snacks	1.8†‡	3.1†§	4.1†§	1.2†‡	1.9†§	2.4†§	6.3†‡	11.1†§	12.3†§
Desserts	8.6†‡	7.8†§	8.6†§	6.1†‡	5.2†§	5.3†§	27.7†‡	25.6†§	23.9†§
Candy	0.7†‡	1.0†§	1.5†§	0.2†‡	0.3†§	0.4†§	4.2†‡	5.4†§	6.5†§
Soft drinks	2.8†‡	4.0†§	5.2†§	2.1†‡	3.2†§	4.4†§	8.1†‡	9.0†§	8.6†§
Fruit drinks	1.1†‡	1.2†§	1.9†§	1.0†‡	1.1†§	1.7†§	2.2†‡	2.3†§	3.0†§
Alcohol	1.6†‡	1.9†§	2.3†§	1.0†‡	1.2†§	1.4†§	6.2†‡	6.1†§	6.5†§
French fries	1.5†‡	1.9†§	2.1†§	1.6†‡	2.2†§	2.4†§	0.4†‡	0.5†§	0.6†§
Hamburgers	0.7†‡	0.7†§	0.7†§	0.7†‡	0.8†§	0.9†§	0.3†‡	0.2†§	0.2†§
Cheeseburgers	0.3†‡	1.2†§	1.2†§	0.3†‡	1.3†§	1.3†§	0.1†‡	0.5†§	0.4†§
Pizza	1.0†‡	2.7†	2.5†	1.0†‡	2.9†	2.8†	1.3†‡	1.4†§	1.2†§
Mexican	0.3†‡	1.0†§	1.4†§	0.3†‡	1.1†§	1.6†§	0.0†‡	0.4†§	0.6†§
Low- and medium-fat milk	8.8†‡	7.4†§	6.0†§	8.6†‡	7.3†§	5.8†§	10.4†‡	8.2†§	6.9†§
Medium- and high-fat beef and pork	10.9†‡	4.9†§	4.0†§	12.1†‡	5.5†§	4.7†§	1.5†‡	0.8†§	0.7†§
High-fat lunchmeats and hot dogs	3.0†‡	2.0†	2.0†§	3.2†‡	2.2†§	2.2†§	1.3†‡	0.8†§	0.9†§
Other	57.0†‡	59.0†§	56.5†§	60.5†‡	63.8†	62.7†§	30.0†‡	27.7†§	27.6†§
Total	100	100	100	100	100	100	100	100	100
Total energy (kcal)	1791†	1795§	1985‡§	1588†‡	1559†§	1634†§	203†‡	236†§	351†§

\* Adjusted for age, sex, education level, ethnicity, region, urban classification, household size, and % poverty,  $p \leq 0.01$ .

† Significant difference between 1977 to 1978 and 1989 to 1991.

‡ Significant difference between 1977 to 1978 and 1994 to 1996.

§ Significant difference between 1989 to 1991 and 1994 to 1996.



**Total Energy Percentages by Key Food Groups**

Among the foods that we chose to examine, the largest increases were in consumption of salty snacks, soft drinks, and pizza. For 2- to 18-year-olds and 19- to 39-year-olds, the intake of salty snacks and pizza increased between 132% and 143% from 1977 to 1996. Furthermore, for these two age groups, soft drink consumption increased between 70% and 83% in this time period. During this time, 40- to 59-year-olds increased their salty snack intake by 280% and of soft drinks by 110%. The increases for the elderly were very small. Consumption of candy, fruit drinks, french fries, cheeseburgers, and Mexican food also increased for all age groups but only accounted for a small percentage of the total diet, and the changes over time were small. Low- and medium-fat milk and medium- and high-fat beef and pork consumption decreased substantially across all age groups, and high-fat luncheon meat and hot dog intake decreased slightly (Table 3).

For all Americans age 2 years and up, there were some overall differences in energy intake in snacks and meals with respect to key food items. In general, across all age groups for both snacks and meals, consumption of low- and medium-fat milk and desserts decreased. The other food groups with important trends, french fries, hamburgers, cheeseburgers, pizza, Mexican food, and medium- and high-fat beef and pork, were not important components of snacks but rather of meals. Overall, Americans increased their energy intake of french fries, hamburgers, cheeseburgers, pizza, and Mexican food as part of meals from 3.9% to 9% from 1977 to 1996. If one looks at the age patterns for these foods as a meal, 2- to 18- and 19- to 39-year-olds increased their intake from ~5% of energy to 9% to 11% of energy; the increases were much smaller for the other age groupings.

Sugared beverages (combined food group of fruit drinks and soft drinks) increased more for meals overall but played a larger role in snacks. Overall, Americans increased their consumption of sugared beverages as part of a meal from 3.1% to 6.1% and as part of a snack from 10.3% to 11.6%. Furthermore, sugared beverages were consumed more by younger age groups, 2- to 18-year-olds and 19- to 39-year-olds.

For snacks, the largest increases were in the salty snack category; overall, Americans increased their salty snack consumption as a snack from 6.3% to 12.3% over 20 years; however, for meals, these foods only increased from 1.2% to 2.4%. All age groups significantly increased their consumption of this group of foods.

Are there age-related differences in the trends? An important and interesting finding was the fact that although each age group increased its energy intake from certain locations as well as from certain key foods, the increase was

in proportion to that of the other age groups. In Figures 1 and 2, we present the age-adjusted relative shift in the energy consumed by selected food locations and selected food groupings from 1977 to 1996. These results were age-adjusted to the 1980 U.S. census age distribution of persons  $\geq 2$  years in the U.S. because of the significant shift in the age distribution of the population between the years of 1977 and 1996. These figures provide a sense of how the proportion of energy for the average American in 1977 changed for each age group in the subsequent 20 years. For instance, 2- to 18-year olds are consuming ~28% of their total energy intake from foods consumed at home, whereas 19- to 39-year-olds are consuming ~35%, 40- to 59-year-olds are consuming 21%, and the elderly are consuming 17%. This has remained remarkably constant over the past 20 years as has restaurant/fast-food consumption. For instance, the younger 2- to 18-year-olds consumed 27% and 28% of total at-home energy in 1989 and 1996, respectively. In other words, there was no shift in the relative proportion of energy consumed at home for this age group. It is important to note, however, that the total energy from at-home food increased for this 2- to 18-year-old age group, i.e., the total kilocalories consumed in 1977 and 1996 were 1839 and 1958 kilocalories, respectively. In all cases, the absolute energy changed over time; however, the percentage shifts in types of food and locations were very small.

We can also see that the 2- to 18-year-olds consumed 28% of all energy from the home but only 19% of all energy from restaurant and fast-food sources, whereas the proportions were much greater for the away-from-home category for 19- to 39-year-olds (24% of at-home and 51% of restaurant/fast-food energy; Figure 1).

Interestingly, if there was any shift in the types of foods consumed by the age groupings, there was a small shift away from those aged 2 to 18 toward those aged 19 to 39 with regard to the total proportion of the fast-food grouping of hamburgers, cheeseburgers, french fries, and pizza. Approximately 34% of salty snacks were consumed by 2- to 18-year-olds, and this has remained relatively constant for the past 20 years. This is also true for the other age groups in which another ~38% of salty snack calories were eaten by 19- to 39-year-olds, ~18% by 40- to 59-year-olds, and ~9% for 60-year-olds. This trend is further confirmed with other food categories, including a combined fruit drink and soft drink category and a combined fast-food category that includes hamburgers, cheeseburgers, french fries, and pizza (Figure 2).

In addition, the same age breakdowns for food location and food sources were examined for meaningful trends by sex, race, education, and income. The differences between-groups were very small and are not reported. The only very substantial difference was that men's intake of alcohol as a snack was much higher than that of women.



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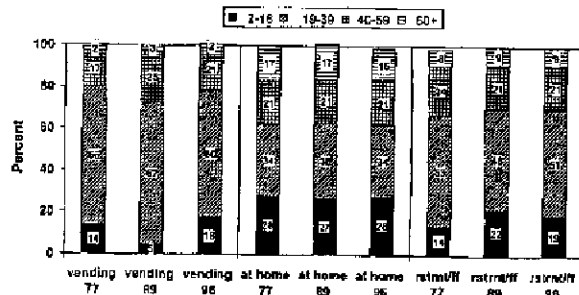


Figure 1: Trends in the proportion of food consumption for selected eating locations by age groups, 1977 to 1996.

### Discussion

At a time of increased concern about a positive energy imbalance and the resulting increase in obesity, few studies have focused on trends in total energy intake and its sources. If the trends in total energy intake are to be believed, then Americans have increased their energy consumption over the past 20 years (4,12-14). Although there are many shortfalls in the methods used to collect dietary data and thus the possibility of measurement error exists, there is still much that can be obtained from the data that has been collected. Although there were major methodological differences in the survey methodologies for collecting dietary data for both the National Center for Health Statistics (NCHS) National Health and Nutrition Examination Survey and the USDA's CSFII, there is still some feeling that there has been a real increase in energy intake between 1989 and 1996 (14). This is further supported by the fact that under-reporting has increased over time (19). Also there is no information in the U.S. to indicate systematic bias in reporting by eating location. Thus, we feel that the trends in eating behavior highlighted are still representative of those occurring among Americans.

The most significant trend is clearly the continued shift of our energy intake from home to away-from-home sources. Today the average American consumes <65% of his/her energy at home. Over the past 20 years the decline has been from 76.9% of energy consumed at home to 64.5%. The vast amount of this increase has been a more than doubling of the energy consumed at restaurants and fast-food establishments. Some age groups, such as young adults aged 19 to 39, consume close to 30% of their energy from restaurant and fast-food establishments. Older adults and the elderly consume much less. Many other scholars have reported similar shifts toward greater food consumption in restaurants and fast-food places (6-9).

At the same time there have been important changes in the foods consumed. As would be expected from the increase in restaurant and fast-food consumption, important increases have occurred in the proportion of the energy intake from pizza, cheeseburgers, and french fries. The

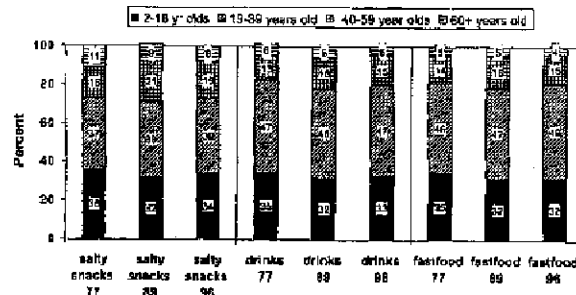


Figure 2: Trends in the proportion of food consumption for selected food groupings by age groups, 1977 to 1996.

largest shifts have been in energy from sugared beverages. The most important relative decreases have been in milk and meat products eaten alone. This reflects the important shift to higher-fat mixed-grain-based dishes (20,21). Another interesting point is that in 1996 all of the hamburgers and cheeseburgers that were consumed and 50% or more of the french fries that were consumed by all age groups were consumed in a restaurant or fast-food establishment. This means that few individuals are preparing at home certain items that can easily be obtained outside the home.

As would be expected when restaurants and fast-food establishments are where people go to get meals, there have also been increases in consumption of french fries, cheeseburgers, hamburgers, pizza, and Mexican food as meal items. Furthermore, it has been shown that for snacks, salty snacks as well as soft drinks are being consumed in greater quantities. In addition, store eaten out is the location that is increasing for snacks. This further confirms the assertion that the changes in food location and the changes in food items are not separate issues but really the same issue. One cannot look at these issues individually without missing part of the story behind why the changes are taking place. To completely understand the changes in the diets of Americans one needs to look at the diet from the perspective of both key foods and food location. This enables us to present the whole picture of how American diets are changing.

Our results contradict the general feeling that the major shifts in eating behavior are among the young. Although most nutritionists and many authors have felt that certain age groups were changing at a faster pace than others, specifically that adolescents and young adults were eating more fast-foods outside the home than middle-aged adults and the elderly, this is not the case (22,23). All age groups are increasing their energy intake from specific locations and for specific food items in proportion to one another. Although there are differences in the amounts of foods consumed and the location of foods consumed by age, these differences have remained constant over the past 20 years. This dispels the idea that certain age groups are increasing

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their intake disproportionately (e.g., the explosion in intake of soft drinks or french fries was only for teenagers or other selected subpopulation groups). In other words, it has been shown that intake of foods eaten outside the home is increasing and contributes to increased energy intake and, possibly, the increase in obesity as well (4,24). Indeed, even so-called fast-foods such as burgers, french fries, and pizza are consumed more by the young and the middle-aged, but over time these age groups are still consuming the same proportion of these foods in 1996 as they were in 1977. This similarity of trends across all age groups also dismisses the idea of a cohort effect taking place. This raises a very important issue that our whole environment is changing, not just the actions of certain individuals.

It is apparent that people of all ages are making unhealthy choices both inside and especially outside the home, and this should be the focus of public health policies and interventions. Although there have been some positive changes, including decreased consumption of medium- and high-fat beef and pork, there seem to be many other components of the American diet that need to be changed. One important way of changing people's diets is to encourage them to eat at home more and to make healthier choices when eating out. Consumers need to be encouraged to eat more fruits and vegetables and fewer high-fat mixed-grain-based dishes. It is hoped that if consumers change their diets to include more healthful food choices inside and outside the home, the rise in obesity will be curbed along with the accompanying rise in chronic diseases (9,25).

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**EXHIBIT 7**

## RESEARCH AND PRACTICE

# Attacking the Obesity Epidemic: The Potential Health Benefits of Providing Nutrition Information in Restaurants

Scott Burton, PhD, Elizabeth H. Creyer, PhD, Jeremy Kees, PhD, and Kyle Huggins, MBA

Sixty-four percent of American adults are either overweight or obese, and the obesity epidemic shows few signs of weakening.<sup>1,2</sup> Although the precise number of deaths attributable to obesity is difficult to estimate, obesity is clearly a major cause of preventable death.<sup>3,4,5</sup> Not surprisingly, improving the healthfulness of the American diet has become a national health priority.<sup>4,6</sup> The increasing prevalence of obesity-related diseases has been blamed, in part, on the increased consumption of foods prepared outside the home. Restaurant expenditures have increased consistently in recent decades; consumers now spend more than \$400 billion annually.<sup>7</sup>

Increased consumption of food prepared outside the home and the rising percentage of overweight Americans have made the failure to disclose the nutritional content of restaurant foods a significant public health issue. Whereas the Nutrition Labeling and Education Act increased the availability of nutrition information on packaged foods, foods purchased for immediate consumption are exempt from nutrition disclosure requirements. Typically, fast-food restaurants make nutrition information available to consumers upon request through brochures or on their corporate Web sites. Most dinner house restaurants (i.e., restaurants that offer table service in an informal atmosphere) disclose the nutrient content of their menu items only via the Internet, if at all.

Laws governing the provision of nutrition information in restaurants have been under consideration by Congress. The Menu Education

**Objectives.** Requiring restaurants to present nutrition information on menus is under consideration as a potential way to slow the increasing prevalence of obesity. Using a survey methodology, we examined how accurately consumers estimate the nutrient content of typical restaurant meals. Based on these results, we then conducted an experiment to address how the provision of nutrition information on menus influences purchase intentions and reported preferences.

**Methods.** For both the survey and experiment, data were analyzed using an analysis of variance techniques.

**Results.** Survey results showed that levels of calories, fat, and saturated fat in less-healthy restaurant items were significantly underestimated by consumers. Actual fat and saturated fat levels were twice consumers' estimates and calories approached 2 times more than what consumers expected. In the subsequent experiment, for items for which levels of calories, fat, and saturated fat substantially exceeded consumers' expectations, the provision of nutrition information had a significant influence on product attitude, purchase intention, and choice.

**Conclusions.** Most consumers are unaware of the high levels of calories, fat, saturated fat, and sodium found in many menu items. Provision of nutrition information on restaurant menus could potentially have a positive impact on public health by reducing the consumption of less-healthy foods. (*Am J Public Health*. 2006;96:1669–1675. doi:10.2105/AJPH.2004.054973)

and Labeling Act would require chain restaurants with 20 or more outlets to provide key nutrient information. Legislation has also been proposed in several states (e.g., New York) that would require restaurants with 10 or more national locations to disclose the calorie and nutrient content, such as fat and saturated fat levels, of their foods.<sup>8</sup> The Food and Drug Administration has initiated preliminary discussions about national standards for the provision of nutrition information in restaurants in response to these legislative initiatives.<sup>9</sup>

We examined the potential public health benefits of providing easily accessible nutrition information in restaurants through 2

studies. In study 1, a survey of consumers was used to examine the accuracy of consumers' expectations of the calorie, fat, saturated fat, and sodium levels of restaurant foods, and sought to determine whether the difference between expected and objective levels varied depending on the calorie and nutrient levels of the items. In study 2, drawing on findings from our survey, we investigated how the provision of nutrition information on a menu affected consumers' attitudes and purchase intentions when objective calorie and nutrient levels were either much higher or about the same as consumers expected.

## STUDY 1: SURVEY

Recent legal and regulatory initiatives regarding nutrition information disclosure in restaurants are largely driven by an interest in the negative health consequences associated with the overconsumption of calories and nutrients such as fat, saturated fat, and sodium. This raises an important question: What are the expectations of reasonable consumers regarding

the nutrient levels of typical restaurant fare? Study 1 compared estimated calorie, fat, saturated fat, and sodium levels of foods typically served in dinner house restaurants with objective values determined by laboratory testing.

We proposed that most consumers lack the expertise necessary to estimate calorie and nutrient levels accurately. Because nutrition infor-

mation is difficult, if not impossible, to obtain in most dinner house restaurants, consumers are unlikely to realize that large restaurant portions of higher-calorie and higher-fat menu items (e.g., large bowl of fettuccine Alfredo) may exceed a full day's worth of fat and saturated fat. Therefore, we expected consumers to substantially underestimate calories and fat,

## RESEARCH AND PRACTICE

saturated fat, and sodium levels. This is consistent with previous research showing that when presented with large portion sizes of less-healthy foods, professional nutritionists underestimated calorie levels by between 200 and 500 calories.<sup>10</sup> However, we anticipated that consumers' estimates would be more accurate for the food items lower in calories and fat (e.g., grilled chicken breast).

Thus, we hypothesized that (1) the difference between consumers' expectations and objective levels of calories and nutrients would be greater for items with higher levels of calories, fat, and sodium than for items with lower levels of calories, fat, and sodium (hypothesis 1) and that (2) a greater percentage of consumers would underestimate calorie and nutrient levels for menu items with higher levels of calories, fat, and sodium than for items with lower levels (hypothesis 2).

## METHODS

Study participants were recruited through a statewide mail research panel and by undergraduate students. Ninety-seven percent of respondents had dined at a restaurant in the past month; the mean dining-out frequency was 14 meals. Almost all (97%) were high-school graduates and 81% had at least some college. The median age of respondents was 39 years, and 60% were female. The total sample size was 193 respondents. Results of tests of hypotheses were consistent across demographic groups, the household research panel respondents, and the sample of adult consumers.

For 9 restaurant entrées, survey participants were given serving size information and brief item descriptions, similar to information that would appear on a menu. For each item, participants estimated calories, fat, saturated fat, and sodium levels. Measures of the objective (actual) calorie and nutrient levels for each of the 9 items were obtained from independent laboratory testing performed previously for dinner house restaurant items.<sup>11</sup> Three items shown in Table 1 (e.g., grilled chicken breast) were lower in calories and fat (370 to 640 calories; 6 to 26 g of fat) than other entrées. Five items (e.g., hamburger with fries) were much less healthy (930 to 1660 calories; 63 to 97 g of fat). (Although it can be argued that there are no "unhealthy"

TABLE 1—Accuracy of Consumers' Estimates of Calories, Fat, Saturated Fat, and Sodium for Restaurant Menu Items<sup>a,b</sup>

	Calories						Fat						Sodium						Saturated Fat					
	Mean	Objective	Estimates	Mean	Objective	Estimates	Mean	Objective	Estimates	Mean	Objective	Estimates	Mean	Objective	Estimates	Mean	Objective	Estimates	Mean	Objective	Estimates	Mean	Objective	Estimates
Less-healthy items																								
Means																								
Fettuccine Alfredo	634	1336	-642 (-93)	32	75	-44 (-137)	90 (10)	457	2014	-1557 (-341)	93 (7)	15	30	-15 (-100)	80 (20)									
Hamburger and fries	704	1500	-796 (-113)	31	97	-66 (-213)	96 (4)	478	1030	-552 (-115)	88 (12)	13	48	-35 (-289)	95 (5)									
Chicken fajitas	777	1240	-463 (-60)	37	67	-30 (-81)	88 (12)	523	1270	-747 (-143)	87 (13)	17	29	-12 (-71)	77 (23)									
Chef's salad	704	1660	-956 (-136)	31	63	-32 (-103)	96 (4)	451	3860	-3209 (-112)	99 (1)	14	19	-5 (-36)	67 (33)									
Party melt and fries	452	930	-478 (-106)	21	71	-50 (-238)	97 (3)	328	2510	-2182 (-665)	99 (1)	9	18	-9 (-109)	82 (16)									
More-healthy items																								
Means																								
Chicken breast	500	543	-43 (-9)	23	15	8 (35)	37 (63)	333	1180	-847 (-254)	92 (8)	11	6	5 (45)	30 (70)									
Pot roast	479	640	-161 (-34)	22	14	8 (36)	37 (63)	321	820	-499 (-155)	88 (12)	10	5	5 (50)	27 (73)									
Turkey sandwich	653	620	43 (6)	33	26	7 (23)	45 (52)	425	1310	-885 (-208)	92 (8)	15	11	4 (27)	47 (53)									
Very unhealthy item: cheese fries with ranch dressing	358	370	-12 (-3)	15	5	9 (60)	26 (74)	254	1410	-1156 (-455)	96 (4)	7	2	5 (71)	17 (83)									
	869	3010	-2141 (-246)	40	217	-177 (-463)	97 (3)	537	4890	-4353 (-811)	99 (1)	21	91	-70 (-333)	93 (7)									

<sup>a</sup>Information provided for the 9 restaurant menu items included brief descriptions, size of the item in ounces, and any side dishes, all drawn from Jacobson and Hurley.<sup>11</sup>

<sup>b</sup>On the basis of a 2000-calorie diet, the recommended daily values are 65 g for fat, 2400 mg for sodium, and 20 g for saturated fat.

<sup>c</sup>This is the difference between consumers' calorie estimates and the objective levels determined by laboratory testing. The percentage (shown in parentheses) is the mean difference divided by consumers' calorie expectations (e.g., -642/634 = -0.83%).

<sup>d</sup>This is the difference between consumers' sodium estimates and the objective levels determined by laboratory testing. The percentage (shown in parentheses) is the mean difference divided by consumers' sodium expectations (e.g., -1557/457 = -3.41%).



## RESEARCH AND PRACTICE

foods within the context of an entire diet, for the sake of brevity, we use the terms "less" and "more healthful" to refer to menu items higher/lower in calories, fat, and sodium.) The remaining item (cheese fries with ranch dressing) had extremely high calorie and nutrient levels (3010 calories; 217 g of fat) and was termed "extremely unhealthy."

## RESULTS

For each menu item, Table 1 presents consumers' estimated (expected) calorie and nutrient levels, the objective levels, the mean difference between estimated and objective levels, and the percentage of consumers who either overestimated or underestimated calorie and nutrient levels. As shown, less-healthful items were judged to be higher in calories and fat than more-healthful items. This indicates that consumers are at least somewhat aware of nutritional differences among foods.

To test hypothesis 1, individual accuracy scores for calorie and nutrient levels were calculated by subtracting the objective levels from the consumer-estimated levels. These deviation scores were used as the dependent variables in a series of repeated-measures analyses of variance. Differences between consumers' estimates and objective values varied substantially across the more-healthful, less-healthful, and extremely unhealthy items.

## STUDY 2: EXPERIMENT

Given that consumers appear unaware of the high levels of calories, fat, and sodium found in many foods typically served in restaurants, the purpose of study 2 was to examine the potential public health benefits associated with the provision of nutrition information in restaurants. Specifically, we examined how providing nutrition information influenced consumers' attitudes and purchase intentions for restaurant menu items. For each menu entrée, consumers were also asked to estimate how likely they were to gain weight and develop heart disease if that food item was included as a regular part of their diet. These risk perceptions were expected to be influenced by the provision of nutrition information.

Classic expectancy disconfirmation theory can be used to predict consumers' responses

For calories, results of the repeated-measures analyses were highly significant ( $F=2530$ ;  $P<.001$ ). On average, participants underestimated the calorie levels of less-healthful items by 642 calories; objective levels (1336 calories) were almost twice as high as consumers' estimates. The calorie content of cheese fries with ranch dressing (3010 calories) was underestimated by more than 2000 calories. Consumers slightly underestimated calories of the more-healthful items. Follow-up contrasts on the difference scores between expected and the objective calorie measures showed significant differences between the more- ( $M=-43$ ) and less- ( $M=-642$ ) healthful items, as well as between the less-healthful items and the extremely unhealthy item ( $t$  values=37.4 and 54.8, respectively;  $P<.001$  for both comparisons). Thus, as posited, the differences between consumers' calorie estimates and objective levels were far greater for items with less-healthful nutritional content.

Similarly, consumers' expectations of nutrient levels (fat, saturated fat, and sodium) were less consistent with the objective levels for less-healthful items than for more-healthful items. Results from repeated-measures analyses of variance for each nutrient using the difference between consumers' estimates and objective values as the dependent variable resulted in significant findings for all 3 nutrients ( $F$  values exceeded 700 for all tests,  $P<.001$ ).

For the less-healthful items, consumers underestimated fat and saturated fat levels by 44 g and 15 g, respectively—amounts that were more than 60% of the recommended daily values. Estimated fat and saturated fat levels for the more-healthful items were more consistent with objective levels (and even slightly higher). Consumers underestimated sodium levels for the more-healthful items by 847 mg, whereas they underestimated the amount of sodium in the less-healthful and extremely unhealthy items by 1557 mg and 4353 mg, respectively. For all nutrients, follow-up contrasts showed significant differences between the more-/less-healthful and less-/extremely unhealthy groups.

To address differences in percentages of consumers underestimating calorie and nutrient levels, cross-tabulation analyses were performed. As shown in Table 1, 90%, 99%, and 73% of respondents underestimated calories for the less-healthful, very unhealthy, and more-healthful items, respectively ( $\chi^2=102.2$ ;  $P<.001$ ). For fat, 90%, 97%, and 37% of respondents underestimated levels for the less-healthful, very unhealthy, and more-healthful items, respectively ( $\chi^2=509.1$ ;  $P<.001$ ). The pattern of findings was similar for saturated fat ( $\chi^2=433.6$ ;  $P<.001$ ). Although most consumers underestimated sodium levels of all the items, differences were significant ( $\chi^2=13.3$ ;  $P<.01$ ). These findings support hypothesis 2.

when accurate calorie and nutrient information are disclosed.<sup>12,13</sup> According to this theory, consumers form initial expectations about specific product attributes. If the actual information or subsequent experience does not meet expectations, then attribute dissatisfaction will occur, which creates negative attitudes.<sup>12</sup> If actual product information exceeds expectations, positive attitudes result.

Study 1 showed that calories, fat, and sodium in less-healthful restaurant menu items are much higher than consumers expect. However, the objective nutrient levels of more-healthful items were relatively consistent or slightly better than what consumers expected. Therefore, for less-healthful items, the provision of nutrition information should disconfirm consumers' nutrition-related expectations resulting

in unfavorable attitudes and decreased purchase likelihoods. Consumers' perceptions regarding the likelihood of weight gain and heart disease risk should also be higher.<sup>14</sup> Expectancy disconfirmation theory thus suggests that the discrepancy between expected and objective nutrient levels should result in an interaction between the provision of nutrition information and the healthfulness of the menu item. Negative disconfirmation for less-healthful items is expected to lead to decreases in measures of attitudes and purchase intentions and to increase choice preference for more-healthful items. In addition, these effects should generally be greater when both the number of calories and the nutrient levels are provided, compared with when calorie information (a single attribute) is presented alone.

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Thus, we hypothesized that (1) when objective nutrition information is less favorable than consumers expect, providing nutrition information would have a greater negative influence on product attitudes and purchase intentions and a greater positive influence on perceived likelihood of weight gain and heart disease (hypothesis 3a); (2) when objective nutrition information is less favorable than consumers expect, providing *both* calorie and nutrient information would have the strongest influence (hypothesis 3b); and (3) providing nutrition information on menus would decrease choice preference for items with objective nutrition information that is less favorable than consumers expect and increase choice preference for items more consistent with expectations (hypothesis 4).

## METHODS

## Participants

Participants in a geographically dispersed area throughout a single south-central state responded to a mail survey. Participants were mailed packets that included 1 of the randomly assigned 6 menu stimuli, a survey including measures of interest, and a stamped self-return envelope. Completed surveys were returned by 241 respondents, a response rate of 50%. Almost all respondents were high-school graduates (97%), 83% were female, and ages ranged from 23 to 85 years. For the 6 groups in the design, cell sizes ranged from 38 to 42 participants.

## Design

Study 2 had a 3 (nutrition information) × 2 (daily value information) × 4 (menu item) mixed experimental design. The nutrition information and daily value manipulations are between-subjects factors and menu item is a repeated-measure factor. Nutrient information conditions are: (1) calories, fat, saturated/trans fats, and sodium levels presented, (2) only calorie information presented, and (3) no nutrition information presented (status quo in most restaurants). (Note that most proposed legislation would require calorie-plus-nutrient information for restaurants that use menus, but only calorie information for fast-food restaurants with menu boards.) The daily value information disclosure is (1) daily value

**TABLE 2—Means (SD) for Purchase Intentions and Product Evaluation—Dependent Variables for Nutrition Information—Provision Conditions**

Dependent Measures for Nutrition Information—Provision Conditions	Items Less Consistent With Nutrition Expectations		Items More Consistent With Nutrition Expectations	
	Chefs Salad	Hamburger and French Fries	Grilled Chicken Breast and Baked Potato	Turkey Sandwich
<b>Product attitude</b>				
No nutrition information	5.37 (1.8)	4.46 (1.8)	5.66 (1.4)	5.25 (1.6)
Calories only	5.18 (1.6)	4.16 (1.9)	5.80 (1.3)	6.02 (1.4)
Calories and nutrients	4.38 (1.9)	3.72 (2.0)	5.52 (1.5)	5.64 (1.5)
<b>Purchase intentions</b>				
No nutrition information	4.92 (1.7)	4.44 (2.1)	5.59 (1.8)	4.86 (1.9)
Calories only	4.68 (1.7)	3.80 (2.1)	5.58 (1.8)	5.86 (1.5)
Calories and nutrients	3.97 (2.0)	3.43 (2.1)	5.55 (1.7)	5.48 (1.7)
<b>Perceived likelihood of weight gain</b>				
No nutrition information	3.89 (2.0)	7.24 (1.9)	4.32 (1.9)	3.75 (2.0)
Calories only	4.71 (2.3)	7.80 (1.8)	4.43 (1.8)	2.97 (1.7)
Calories and nutrients	5.42 (2.3)	7.53 (1.8)	4.80 (1.7)	3.72 (1.8)
<b>Perceived likelihood of heart disease</b>				
No nutrition information	4.06 (1.8)	7.17 (1.6)	3.97 (1.7)	3.92 (1.9)
Calories only	4.59 (2.1)	7.62 (1.6)	3.86 (1.8)	3.10 (2.0)
Calories and nutrients	5.42 (2.1)	7.41 (1.5)	4.23 (1.6)	3.70 (1.9)

recommendations for fat (65 g), saturated fat (20 g), and sodium (2400 mg) based on a 2000-calorie diet, and (2) a control condition without daily values.<sup>15,16</sup> The nutrition information presented was based on laboratory tests of actual restaurant items. The provision of daily value information had no influence on the dependent measures and is therefore excluded from further discussion.

Four of the items included on the menu were deluxe hamburger with fries, chef's salad, chicken breast with baked potato, and turkey sandwich. As shown in Table 1, for the first 2 items, objective levels of calories, fat, and saturated fat exceeded consumers' expectations. For the latter 2, consumers' expectations were more consistent with objective levels. All information and manipulations were

**TABLE 3—Effects on Purchase Intention and Product Evaluation—Dependent Variables**

	MANOVA Results		Univariate F Values			
	Wilks $\lambda$	F	Product Attitude	Purchase Likelihood	Weight Gain Perceptions	Heart Disease Perceptions
Nutrition information	0.93	1.9	4.2*	2.9	4.2*	3.5*
Daily value information	0.98	1.2	2.9	0.8	0.0	0.7
Item type	0.40	60.0**	56.6**	47.9**	218.4**	231.8**
Nutrition information × Item type	0.91	2.5**	4.0**	5.2**	4.8**	4.6**
Nutrition information × Daily value information	0.94	1.8	2.2	1.4	0.4	0.1
Daily value information × Item type	0.98	1.1	1.4	2.4	0.3	1.2
Nutrition information × Item type × Daily value information	0.97	0.9	2.0	1.1	0.9	0.9

Note: MANOVA = multivariate analysis of variance.

\* $P < .05$ ; \*\* $P < .01$ .



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presented on a 4-color mock restaurant menu stimulus. Respondents were instructed to answer questions regarding the menu items; nutrition was not mentioned.

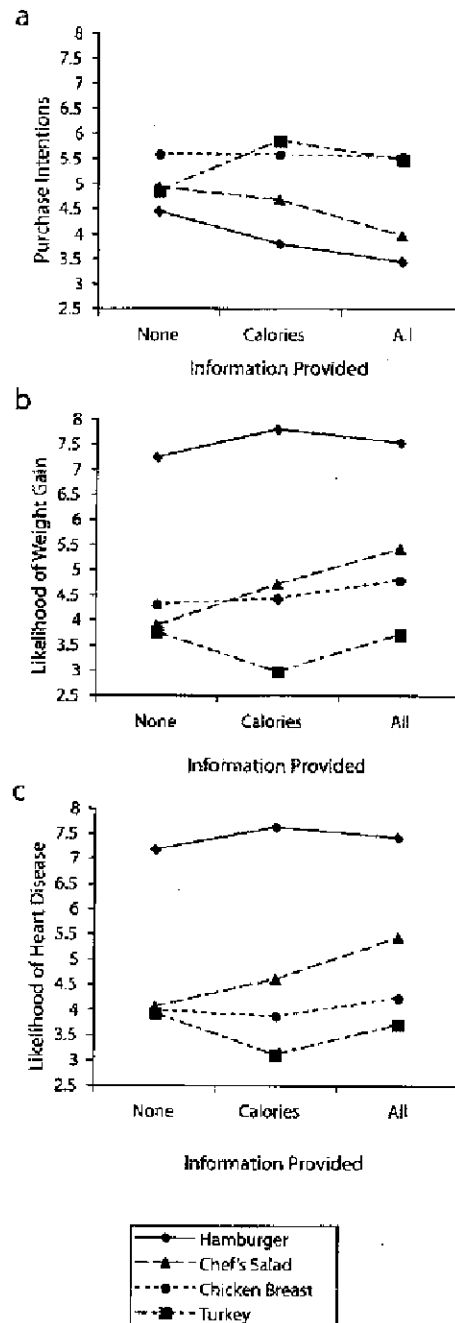
### Measures

For each menu item, overall attitude toward the product and purchase intention were assessed using multi-item 7-point scales (all coefficient  $\alpha$ 's greater than 0.90). To assess consumers' risk perceptions (likelihood of weight gain and heart disease perceptions), 9-point, single-item measures drawn from previous research were employed.<sup>14,17</sup> (Specific items used for measures are available as a data supplement to the online article.) Items were recoded so that higher values indicated more-favorable attitudes and higher perceived risk. A single measure of choice among the 4 items was used ("If you had to choose one of the products described on the mock menu, which one product would you select?").

### RESULTS

To test predictions, a doubly multivariate analysis was performed with SPSS 11.5 general linear models (SPSS Inc, Chicago, Ill). Dependent variable means are shown in Table 2 and multivariate and univariate results are shown in Table 3. There are main effects of nutrition information provision and menu item type for the dependent variables as hypothesized and a multivariate interaction between information provision and menu item ( $P < .01$ ). Univariate interactions are significant for each of the 4 dependent variables. Plots of means relevant to interactions are shown in Figure 1. For the items inconsistent with nutrition expectations (hamburger and chef's salad), purchase intention means followed the predicted pattern. For the hamburger platter, follow-up contrasts showed that relative to the control ( $M = 4.44$ ), there were significant decreases in purchase intentions for both the calories-plus-nutrients ( $M = 3.43$ ;  $t = -2.93$ ;  $P < .01$ ) and calories-only ( $M = 3.80$ ;  $t = -1.89$ ;  $P < .05$ ; 1-tailed test) conditions. The difference between the calorie-only and calorie-plus-nutrients conditions was not significant.

For the chef's salad, contrasts show that compared with the no-information control condition ( $M = 4.92$ ), there was not a significant



Note. For the hamburger platter and chef's salad, consumers' calorie and nutrient expectations (assessed in study 1) generally were less consistent with objective levels than were the chicken breast dinner and turkey sandwich items.

**FIGURE 1—Interaction between nutrition information provided and menu food item for purchase intentions (a), weight gain (b), and heart disease (c).**

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decrease in purchase intentions from the addition of calorie information ( $M=4.68$ ). However, purchase intentions for the calories-plus-nutrient information condition ( $M=3.97$ ) were significantly lower than both the control ( $t=-3.18$ ;  $P<.01$ ) and the calorie-only ( $t=-2.41$ ;  $P<.02$ ) conditions. This pattern is consistent with the nutritional composition of the chef's salad; it contains a moderate number of calories, but substantially exceeds the levels of fat and saturated fat expected by consumers. Thus, hypotheses 3a and 3b were supported.

With the provision of nutrition information, purchase intentions for the expectation-consistent items showed no effect in 1 case and a positive effect in the other case. Specifically, the purchase intentions means were flat for the chicken dinner (ranging between 5.55 and 5.59). For the turkey sandwich, relative to the control ( $M=4.86$ ), the addition of calorie information ( $M=5.86$ ;  $t=3.68$ ;  $P<.01$ ) and calorie-plus-nutrient information ( $M=5.48$ ;  $t=2.22$ ;  $P<.05$ ) resulted in stronger purchase intentions.

Plots for the perceived likelihood of gaining weight and developing heart disease are shown in Figure 1b and 1c. For both variables, univariate analyses of variance were significant for the chef's salad ( $P<.01$ ) and turkey sandwich ( $P<.05$ ), but not significant for the hamburger platter or chicken dinner ( $P>.15$ ). For the chef's salad, the calories-plus-nutrients condition led to higher perceived likelihoods of heart disease and weight gain, relative to the calories-only condition ( $t=2.52$  and  $1.87$ , respectively;  $P<.05$ ). For the turkey sandwich, calories alone decreased both perceived likelihoods ( $P<.05$ ), but the full information did not differ relative to the control. (Presumably, the higher sodium levels revealed in the full-information condition counterbalanced the positive effects of a lower-than-anticipated calorie level.) The pattern of means is particularly interesting for heart disease. With no information, the means for all items except the hamburger platter were almost identical but the calorie and nutrient information widened perceived

differences among these items, and the chef's salad mean increased significantly ( $P<.01$ ). These findings also supported Hypotheses 3a and 3b.

Consumers' item choices were examined across the 3 levels of nutrition information. Results were significant ( $\chi^2=15.6$ ;  $df=6$ ;  $P<.02$ ). When calorie-plus-nutrient information was presented, the percentage of consumers choosing the turkey sandwich (which generally met or exceeded nutrition expectations) increased from 11% to 21%, and it decreased selection of items with higher levels of calories and fat than expected. The share of the chicken dinner (i.e., nutrient levels consistent with expectations) remained constant. In tests comparing the 2 items with higher calories and fat (i.e., items less consistent with expectations) to the 2 more-healthy items, selection of the higher-calorie, higher-fat items decreased from 37% to 24% ( $P<.05$ ) when calorie and nutrition information were provided. These findings supported hypothesis 4.

## DISCUSSION

As a response to the increased prevalence of overweight and obesity, which has been linked with the greater consumption of foods prepared outside the home,<sup>18</sup> legislation has been proposed at both federal and state levels that would require the provision of nutrition information for restaurant food items. Study 1 results showed that, for a number of items, consumers vastly underestimated calories, fat, saturated fat, and sodium levels. On average, less-healthy items were underestimated by more than 600 calories and between one third to a full day's worth of the recommended values for fat and saturated fat. If diners consumed 600 more calories than they realized for just 1 restaurant meal per week, an extra 30 000 calories a year would be added to their diets. These unaccounted calories could cause a weight gain of approximately 9 pounds annually, holding all other factors constant. Over several years' time, this degree of misestimation could cause significant weight gain. Given substantial differences between expected and objective values,

these findings indicate that inclusion of nutrition information on menus offers informational benefits to consumers.

Study 2 findings showed that the addition of calorie and nutrient information for dinner house items influenced attitudes, intentions, and choices. Purchase intention and choice decreased for less-healthy items that were worse than expected (hamburger platter and chef's salad), whereas they remained constant or increased slightly for items more consistent with expectations. The largest changes occurred for the chef's salad, which had the largest deviations from consumer expectations. In the absence of nutrition information, the turkey, chicken, and chef's salad items were indistinguishable in terms of the perceived likelihood of heart disease. However, when calorie and nutrient information were provided, there was a larger difference in disease-risk perceptions.

Our findings have significant public health implications and provide support to the notion that new restaurant-oriented nutrition information initiatives may be warranted. However, circumstances unique to the restaurant industry, such as customized orders and

portion size differences, will make provision of exact nutrition information for every single meal and every consumer difficult. Legislation would probably need to apply to items "as offered for sale," and nutrition disclosure would not include customized orders or daily specials.

Because our results showed that consumers substantially underestimated calorie levels for less-healthy dinner house items and that preference for the less-healthy items diminished when nutrition information was disclosed, provision of nutrition information for chain restaurants' standard menu items would appear helpful. We also recognize that further research may identify additional nutrition formats that may be equally or more effective at conveying nutrition information, and that combining possible social marketing initiatives with future nutrition disclosure research seems warranted. In sum, these findings suggest that the provision of easily accessible nutrition information in restaurants may provide significant public health benefits by making it easier for consumers to make more healthy food choices. ■

## RESEARCH AND PRACTICE

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## Contributors

S. Burton and E.H. Creyer originated the design of the studies and formulated the hypotheses. S. Burton wrote the first draft of the article and performed initial analyses. J. Kees and K. Huggins worked on data analyses and data collection. All authors participated in critical review and revision of the article based on reviewers' recommendations.

## Human Participant Protection

This study was approved by the institutional review board of the University of Arkansas. Informed consent was obtained from study participants.

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**EXHIBIT 8**

# **The Keystone Forum on Away-From-Home Foods: Opportunities for Preventing Weight Gain and Obesity**

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**Final Report  
May 2006**



*1730 Rhode Island Avenue, NW, Suite 509, Washington, DC 20036, (202) 452-1590  
[www.keystone.org](http://www.keystone.org)*

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## Executive Summary

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Over the past two decades in the United States, obesity has become a public health crisis of epidemic proportions. At present, approximately 64% of all U.S. adults are overweight, including 30% who are obese. Overweight and obesity are associated with increased morbidity and mortality, and also exact significant economic costs. The medical expenses attributable to overweight and obesity are estimated to have reached as high as \$92.6 billion per year—roughly 9.1% of total U.S. medical expenditures.<sup>1</sup>

A number of efforts to address and reverse this public health crisis have been and are being undertaken in the public, private, and nonprofit sectors. This report is the final work product of one such effort—the Keystone Forum on Away-From-Home Foods: Opportunities for Preventing Weight Gain and Obesity.

The Keystone Forum was requested and funded by the U.S. Food and Drug Administration.<sup>2</sup> The Forum brought together a wide diversity of participants to develop joint recommendations for action. The participants included representatives from industry, government agencies, civic-sector organizations, and academia. (A complete list of participants can be found in Appendix A of the report.)

### The Forum Process

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The Keystone Forum on Away-From-Home Foods commenced in December 2004 with a small-group planning meeting. Three full-group plenary sessions were subsequently held in Washington, DC, in 2005, and numerous work group discussions were held between plenary meetings. The Forum was convened and facilitated by The Keystone Center, a nonprofit public policy and dispute resolution organization with offices in Colorado and Washington, DC. The Consensus Building Institute provided additional facilitation expertise, and Larmer Consulting assisted with the compilation and editing of this report.<sup>3</sup>

Keystone Forum participants agreed throughout the process to abide by a set of “operating protocols,” which outlined objectives, roles, responsibilities, and a number of discussion principles. Participants were asked to represent their personal views in the discussions and were understood to be speaking on behalf of themselves, not on behalf of their organizations or constituencies. By including their names in Appendix A, Forum participants are indicating that they “generally support” the recommendations and overall content of this report, though they may find some sections more acceptable and compelling than others.

<sup>1</sup> E.A. Finkelstein, I.C. Fiebelkorn, and G. Wang, “National Medical Spending Attributable to Overweight and Obesity: How Much, and Who’s Paying?” *Health Affairs* W3 (2003): 219-226. See [www.cdc.gov/nccdphp/dnpa/obesity/economic\\_consequences.htm](http://www.cdc.gov/nccdphp/dnpa/obesity/economic_consequences.htm).

<sup>2</sup> The content of this publication does not necessarily reflect the views or policies of the U.S. Department of Health and Human Services, nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government.

<sup>3</sup> See [www.keystone.org](http://www.keystone.org), [www.cbuilding.org](http://www.cbuilding.org), and [www.larmerconsulting.com](http://www.larmerconsulting.com).

Forum participants organized the final report, and also this executive summary, into three sections corresponding to the Forum's three primary topics of discussion: (1) Understanding and influencing consumer behavior with regard to away-from-home foods; (2) increasing the availability of lower-calorie products, menu items, and meals at establishments that provide away-from-home foods; and (3) providing consumers with nutrition information regarding away-from-home foods.

## **The Forum's Purpose, Scope, and Rationale**

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The purpose of the Keystone Forum on Away-From-Home Foods was to consider what can be done, given what is currently known, to support consumers' ability to manage calorie intake with respect to preventing undue weight gain and obesity, within the scope of away-from-home foods. Forum participants hope that the American public will be the ultimate beneficiary of the Forum's work. Toward that end, participants expect that this report will be useful to foodservice operators and their suppliers, policymakers, public health and medical professionals, culinary professionals, patient and consumer advocates, and research scientists.

The Forum's discussions focused on obesity and away-from-home foods. The term *obesity* was used to refer to overweight and obesity together.<sup>4</sup> Similarly, the term *foods* was frequently used to refer to both foods and beverages. *Away-from-home foods* include full meals and single ready-to-eat items (including take-away foods) purchased at restaurants, prepared-food counters at grocery stores, institutional foodservice settings, and other outlets.<sup>5</sup>

The concepts of *calorie density* and *nutrient density* were important parts of the Forum's approach to caloric intake in the area of away-from-home foods. Calorie density (also known as *energy density*) refers to the amount of calories (i.e., energy) contained in a unit of food (measured by weight, e.g., kcal/g).<sup>6</sup> Nutrient density refers to the amount and availability of nutrients in a unit of food.<sup>7</sup> The Forum focused on assisting consumers with managing appropriate caloric intake pursuant to obesity prevention. However, while appropriate caloric intake is essential to addressing the problem of obesity, it is also important for consumers to get the most nutritional value from their calories.

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<sup>4</sup> The National Institutes of Health define "overweight" in adults as a body mass index (BMI) of 25.0 to 29.9 and "obesity" as a BMI of 30.0 or higher. BMI is defined as the ratio of a person's bodyweight in kilograms divided by the square of his or her height in meters. See [www.nhlbi.nih.gov/health/public/heart/obesity/lose\\_wt/risk.htm#limitations](http://www.nhlbi.nih.gov/health/public/heart/obesity/lose_wt/risk.htm#limitations).

<sup>5</sup> The topic of school meals was not included in the scope of the Forum's discussions. Although foods sold in schools are a significant source of calories for school-aged children, there was a need to limit the scope of the dialogue to a manageable area of inquiry consistent with the U.S. Food and Drug Administration's own core capabilities and activities.

<sup>6</sup> See [www.health.gov/dietaryguidelines/dga2005/report/HTML/G1\\_Glossary.htm](http://www.health.gov/dietaryguidelines/dga2005/report/HTML/G1_Glossary.htm). Less calorie-dense foods are generally those with a higher water content, such as fruits, vegetables, and soups. While *energy density* and *calorie density* can be used interchangeably, this report generally uses the latter term.

<sup>7</sup> See [www.diet-and-health.net/glossary.html](http://www.diet-and-health.net/glossary.html). Nutrient-dense foods provide substantial amounts of vitamins and minerals, and relatively fewer calories. For an extensive review of literature on nutrient density, see A. Drewnowski, "Concept of a Nutritious Food: Toward a Nutrient Density Score," *American Journal of Clinical Nutrition* 82, no. 4 (2005): 721-732.

The report does not focus on any particular subgroup of the U.S. population. However, participants acknowledged the unique concerns relating to children, since that population group faces significant long-term health consequences due to the obesity epidemic. Therefore, some of the recommendations include consideration of children's unique needs.

Forum participants agreed to consider the role of food in the context of what is known about obesity—in other words, in light of the fact that food, wherever consumed, is a major factor but not the only factor affecting the incidence of obesity. Because obesity and undue weight gain result from sustained energy imbalance (i.e., caloric intake exceeding caloric expenditure), physical activity is also an essential element in obesity prevention and treatment. While this inquiry focused on food choice and consumption, Forum participants recognized that the broad societal effort to reduce obesity incidence must consider both sides of the energy balance equation.

As of this decade, Americans are eating away-from-home foods more frequently and consuming more calories from away-from-home establishments than ever before. Thus, a wider range of less-calorie-dense, more-nutrient-dense food and beverage choices in away-from-home food outlets, coupled with consumer education and information (especially about energy balance), can help Americans to manage their weight more effectively.

While several recent studies have explored various contributors to obesity, as yet there does not exist a conclusive body of evidence establishing a causal link between the availability or consumption of away-from-home foods and obesity. Preliminary research indicates, however, that the consumption of away-from-home foods can be a factor in determining caloric consumption and body weight, and an important one for many individuals. Participants did not seek resolution on this question, but rather focused on proposing implementable solutions to the challenge of obesity.

## **The Forum's Recommendations**

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A summary of Forum participants' recommendations follows. Please note that Chapter 1 does not contain recommendations and so is not summarized below. It describes key observations and background regarding changes in the food environment over the past three decades, and it provides an overview of the research base regarding the relationship between away-from-home foods and body weight. Chapters 2 through 4 also include extensive background information, not summarized here, that provides context for the recommendations and suggested implementation steps.

## **Chapter 2: Understanding and Influencing Consumer Behavior**

To reverse the increase in obesity and undue weight gain in the United States, Forum participants believe the current consumer preference for large quantities of calorie-dense foods should shift to an emphasis on intake appropriate to an individual's needs and to increased consumption of

foods lower in calorie density. However, it can be difficult to change consumers' day-to-day food and activity behaviors, despite the potential longer-term consequences of those behaviors. Thus, messages and education programs directed at consumers should be carefully crafted; they must impart the knowledge and skills consumers need, and they must reach and motivate consumers successfully. Also, strategies should be tailored as needed to specific demographic and cultural audiences.

Much of the existing data and information about consumer eating behavior and attitudes is either not specific to away-from-home foods, not sufficiently timely, or not publicly available. Thus, a research agenda is also needed to augment the publicly available knowledge base and inform the continual development of consumer education programs. It must be stressed, however, that while the knowledge base needs to be improved, enough is known to recommend many important actions. Forum participants believe that reasonable strategies to assist consumers with healthy energy intake should be pursued now, and then augmented going forward as new information becomes available.

Forum participants offer seven recommendations for influencing consumer behavior and attitudes.

**Recommendation 2.1: Shift the emphasis of marketing. The marketing of lower-calorie and less-calorie-dense foods should increase, accompanied by a reduction in marketing that highlights higher-calorie (or calorie-dense) foods or encourages large portions.**

Companies, government, health organizations, and others should expand and align marketing initiatives (both commercial and social) that help consumers to manage their calorie intake. Foodservice companies and venues should use their full range of creativity and resources to promote food choices and eating behaviors that are consistent with healthy weight management. In addition, companies, government, health organizations, and others should conduct market research to determine:

- how best to market low-calorie and less-calorie-dense menu options to different populations in ways that assist consumers with weight management efforts, and
- how to shift the prevailing value proposition away from large portions, and how best to market more appropriate portion sizes to different populations.

**Recommendation 2.2: Update marketing standards. Industry, government, health and nutrition experts, consumer representatives, and other stakeholders should work together to review and update standards for marketing away-from-home foods to children.**

The Children's Advertising Review Unit (CARU), which is funded by members of industry, could work with key stakeholders from the public, private, and civic sectors to review and update its standards for marketing to children, including the marketing of away-from-home foods. CARU maintains self-regulatory guidelines for children's advertising, and as of this writing has announced an extensive and consultative review of those guidelines.

**Recommendation 2.3:** Promote low-calorie-dense dietary patterns. Strengthen and/or create education and promotion programs regarding away-from-home foods that promote the consumption of fruits, vegetables, no- and low-fat milk and milk products, whole grains, and foods low in saturated fats and trans-fatty acids, as recommended by the 2005 *Dietary Guidelines for Americans*.<sup>8</sup>

For example, the national 5 A Day for Better Health program could be significantly expanded and strengthened, and the U.S. Department of Agriculture (USDA) could create a federal marketing matching program for promoting fruits and vegetables. Federally sponsored consumer research could be undertaken to develop behavior change strategies for closing the gap between recommended intakes and current consumption.

The Milk Matters program at the National Institute of Child Health and Human Development, as well as the Powerful Bones, Powerful Girls program at the Centers for Disease Control and Prevention, could also be significantly expanded and strengthened to build skills for selecting foods and beverages away from home. The programs could include a large-scale social marketing campaign to promote the intake of three daily servings of low-fat and nonfat milk and milk products, consistent with the Dietary Guidelines.

**Recommendation 2.4:** Promote enhanced “lifestyle education” programs. Use a combination of social marketing campaigns and consumer education programs to provide “healthy lifestyle” education to help individuals eat more healthfully in today’s food environment. Existing campaigns and programs could be enhanced or, as necessary, new ones could be created.

Both campaigns and programs in various sectors should aim to help individuals understand how to make decisions within the food environment healthfully—i.e., how to navigate the wide range of away-from-home food choices available in today’s often harried, time-pressed, convenience-driven world. A social marketing campaign should focus on those areas with the most supporting evidence and strongest justification for action.<sup>9</sup> For example, a campaign could seek to change the social value proposition of “more food” to “better-quality food,” and/or to promote the concept of energy balance—i.e., balancing caloric intake with physical activity expenditure.

**Recommendation 2.5:** Review the effectiveness of existing programs. The U.S. Department of Health and Human Services (HHS) and the USDA should, in partnership together, coordinate a comprehensive survey and analysis of existing government-sponsored education and social marketing campaigns related to managing weight gain and reducing obesity in the context of away-from-home foods.

With HHS and USDA as the coordinators and conveners, key federal agencies should pool resources to sponsor a systematic survey and analysis of education and social marketing campaigns directed at consumers who are trying to manage weight gain and obesity. Individual

<sup>8</sup> U.S. Department of Health and Human Services (HHS) and U.S. Department of Agriculture (USDA), *Dietary Guidelines for Americans 2005* (6th ed.) (Washington, DC: HHS and USDA, 2005).

<sup>9</sup> “Social marketing” programs typically seek to improve personal or societal welfare—for example, by promoting healthy eating, active living, avoidance of illegal drug use, or proper use of seat belts.

agencies should be responsible for analyzing the programs they administer. A standard evaluation tool should be developed for assessing the relative success of each program in helping consumers with healthy weight management.

The analysis should seek to identify the target audiences (and any key audiences that have been missed), the kinds of programs implemented, and their effectiveness against criteria developed by the study team, such as ease of understanding by consumers, consumers converting that understanding to action, and costs. The analysis should offer recommendations for how to streamline government efforts to use resources more efficiently, increase the frequency and consistency of messages, and ultimately, more effectively influence consumers' behavior.

**Recommendation 2.6: Improve government access to data on consumer behavior and attitudes.** Federal agencies should act immediately to increase the access of government researchers and policymakers to syndicated commercial databases. Key agencies should establish recurring line items in their respective budgets, thereby ensuring continual and timely access to the needed commercial data sets.

Key agencies should coordinate needs and resources in order to purchase relevant commercial data sets from syndicated research organizations. Interagency collaboration is needed to ensure adequate funds for an initial purchase, to promote coordinated policies and programs that result from an analysis of the data, and to encourage the widest possible access to the data.

**Recommendation 2.7: Ensure public availability of information.** A means must be developed for continually improving the publicly available knowledge base regarding consumer interests, attitudes, and behaviors regarding away-from-home foods.

Since government access to commercial data sets, while very important, is typically accompanied by nondisclosure terms that may limit direct analysis of the data by other stakeholders, a collaborative research agenda could also be developed to allow for wider access to timely information regarding consumer behavior and attitudes in the area of away-from-home foods. Alternatively, the scope of existing data-gathering initiatives could be expanded to provide more detail regarding behaviors and attitudes regarding away-from-home foods, both nationwide and within key demographic groups. Data should not only be collected, but it should be analyzed and shared with the public, policymakers, health professionals, and other interested stakeholders.

### **Chapter 3: Increasing the Availability of Lower-Calorie Products, Menu Items, and Meals**

The foodservice industry faces a number of challenges in its efforts to provide menu items and meals that help consumers effectively manage their calorie intakes and thus maintain healthy weight. These challenges can be viewed as opportunities for the industry to take a proactive role in combating the national problem of overweight and obesity. With this in mind, Keystone Forum participants sought to propose some achievable, action-oriented strategies for the foodservice industry, including bold and innovative approaches (in which taste was a non-

negotiable “must”) with regard to products, menu items, and meal choices, to assist consumers with managing calorie intake.

To address the Forum’s goal of reducing obesity, the recommendations and operational tips provided in the report focus on manipulating the calorie content, including the calorie density, of menu items and meals through several strategies: providing appropriate portion sizes, plate composition, menu pairing, and beverage options; increasing fruits and vegetables; reducing total fat content; and decreasing the use of ingredients that are high in refined starches, added sugars, and saturated and trans fats and low in nutrient density.

Forum participants articulated four recommendations, directed primarily at the foodservice industry, to address these issues. The recommendations are followed by specific operational tips, which are meant to serve as examples of how the recommendations could be implemented and should not be considered all-inclusive.

**Recommendation 3.1: Promote the wider inclusion in foodservice of less-calorie-dense menu items and calorie-sparing cooking techniques that are widely accepted by consumers and that take into account constraints on operators.**

To implement this recommendation, Forum participants believe that culinary educational facilities should provide chefs and foodservice operators with the necessary education, resources, and skills to produce menu choices that will help customers achieve and maintain a healthy weight. They should, for example, provide educational programs that illustrate how to develop less-calorie-dense menu items and that overcome the perception that healthy menu items lack creativity and flavor. Chefs and restaurateurs should also be encouraged to offer more lower-calorie choices on children’s menus.

In addition, appropriate government agencies should, in conjunction with industry, stimulate initial educational and leadership efforts. They should provide grants to help culinary schools develop curricula or other resource materials that reflect the current consensus within the scientific community about cooking methods and approaches that help consumers achieve and maintain a healthy weight.

Finally, the synergy between producers/manufacturers, distributors, and operators should be enhanced, in order to facilitate the purchase and use of the products that are needed to produce new or reformulated menu items and meals, to help consumers manage their energy intake. Chapter 3 suggests numerous ways this could be done; for example, industry leaders and appropriate government agencies should encourage manufacturers to offer foodservice-size packaging for products such as evaporated fat-free milk, lower-fat cheeses, and precut vegetables, all of which can be used to make less-calorie-dense menu items.

**Recommendation 3.2: Foodservice providers should develop and promote portion-size, plate composition, and menu-pairing options that help consumers in their efforts to manage their energy intake.**



The chapter offers numerous implementation strategies geared toward chefs, menu developers, servers, and customers. For example, these individuals are encouraged to:

- Reduce total calories in mixed dishes by combining moderate reductions in calorie density with changes in portion size.
- Retool menu items to provide lower-calorie-dense choices.
- For sandwiches, offer more fruit and/or vegetable options than just lettuce and tomato. For example, offer roasted red peppers, roasted eggplant, cucumbers, etc.
- Provide more options and promote meal bundles with fruits and vegetables (including salads), while maintaining traditional side options as well.
- Offer several portion sizes of each menu item.
- Adopt approaches to support portion-size reduction and/or curtail emphasis on “bigger means better” messages.

**Recommendation 3.3: Foodservice providers should develop, make available, and promote beverage options that help consumers to reduce calorie intake.**

To do this, Forum participants suggest that industry leaders:

- Increase the range of low-calorie or zero-calorie beverage choices available to consumers and provide smaller portion sizes (e.g., 10-fluid-ounce sizes, 100-calorie servings, etc.).
- Increase the selection of low-fat or nonfat milk beverages, especially with children’s meals.
- In specialty venues such as coffee shops, offer lower-calorie selections and smaller portion sizes of specialty and frozen drinks, in addition to the standard versions.
- Expand the range of beverage options available to consumers to include a wider array of cup and bottle sizes.
- Consider pricing approaches that make smaller sizes and lower-calorie options more appealing.
- For bundled meals, offer lower-calorie beverage options, such as water, and encourage reasonable portion sizes.

**Recommendation 3.4: Industry and academia should conduct—collaboratively, if possible—research on the topics and questions listed in Chapter 3. In addition, a specific scientific survey should be conducted about the experiences of operators and restaurateurs in developing menu items that could aid in weight management.**

Chapter 3 sets forth a number of potential research questions that should be addressed through collaborative research. The questions address basic research needs as well as suggestions for the development of specific, scientifically sound strategies that will lead to a better-informed public, industry, and academic community. The questions are categorized into four topics: calorie density and portion size; increasing fruits and vegetables; product formulation; and packaging and marketing.

In addition, a scientifically rigorous survey should be conducted after the conclusion of the Forum to gather information from chefs and restaurant owners about their experiences helping customers to manage their weight and health, particularly via product reformulation and innovation.

## Chapter 4: Providing Consumers with Nutrition Information

When making decisions about away-from-home foods, consumers often may not have access to nutrition information to inform their selections and eating behaviors pursuant to appropriate calorie intake. Whereas a growing number of foodservice venues voluntarily provide some information about the calorie and nutritional content of their menu items, many do not. Available information may be provided in different formats (e.g., websites, brochures, kiosks), focus on a variety of nutrients (e.g., calories, carbohydrates, fat), and take a variety of forms (e.g., numerical values, symbols, written characterizations of health attributes). In the absence of any nutrition information, consumers typically are unable to assess the caloric content of foods.

Forum participants offer the following two recommendations regarding the provision of nutrition information to consumers.

**Recommendation 4.1: Away-from-home food establishments should provide consumers with calorie information in a standard format that is easily accessible and easy to use.**

Forum participants believe that information should be provided in a manner that is easy for consumers to see and use as part of their purchasing and eating decisions. Information should be provided for any standard menu item offered on a regular and ongoing basis that is prepared from a standardized recipe, whether the item is an entire meal or a meal component. Non-standard items, including daily specials and experimental items, may be exempted. Information should be provided for the standard menu item as usually offered for sale (i.e., the base product, in the portion size as offered for sale), since most means of providing information cannot easily account for changes due to customization and special orders. Also, information should be accompanied by a caveat regarding variations owing to preparation, customization, and server variability.

Single-store operations and small chains may not be able to provide nutrition information. Other foodservice venues, such as contract dining services, that have variations in sourcing and preparation, or that do not have standard menus, may also have difficulty providing information that is accurate, reliable, and consistent. However, restaurants and other foodservice operators are encouraged to provide the information to the extent feasible.

In addition to these implementation tips, the chapter's discussion of Recommendation 4.1 addresses the cost of providing nutrition information, methods of nutritional analysis, means of delivering the information, possible unintended consequences, and considerations regarding the provision of nutrition information beyond calories, children's needs, and the accuracy of the information.

**Recommendation 4.2: Research by multiple sectors should be conducted on how consumers use nutrition information for away-from-home foods; how this information affects their calorie intake at that venue; how and why nutrition information affects operators' decisions, costs, and revenues; and unanticipated consequences.**

There is a clear need for more research regarding how the provision of nutrition information, claims (such as “low calorie”), and symbols influence consumer preference and choice for away-from-home food consumption situations. Of particular concern is how, when, and why consumers use nutrition information and claims during their decision-making processes. More specifically, a better understanding is needed of the types of factors that moderate consumers’ responses to the provision of nutrition information and claims for away-from-home foods. The chapter concludes with a list of suggested research questions for addressing these topics.

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Taken together, the recommendations in this report address important challenges, and also provide opportunities for multiple sectors to have a positive impact on the task of helping consumers manage their energy intake with respect to away-from-home foods. It is hoped that all sectors—public, private, and civic—can take action based on these recommendations and implementing strategies to help address the growing problem of obesity in the United States.

## Chapter 3

# Increasing the Availability of Lower-Calorie Products, Menu Items, and Meals

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The foodservice industry faces a number of challenges in its efforts to provide menu items and meals that help consumers effectively manage their calorie intakes and thus maintain healthy weight. These challenges can be viewed as opportunities for the industry to take a proactive role in combating the national problem of overweight and obesity. With this in mind, Keystone Forum participants sought to offer the foodservice industry some achievable, action-oriented strategies, including bold and innovative approaches (in which taste was a non-negotiable “must”), with regard to products, menu items, and meal choices, to assist consumers with managing calorie intake.

Forum participants sought to create recommendations and operational tips that are practical to implement. To address the Forum’s goal of reducing obesity, the recommendations focus on manipulating the calorie content, including the calorie density, of menu items and meals through several strategies: providing appropriate portion sizes, plate composition, menu pairing, and beverage options; increasing fruits and vegetables; reducing total fat content; and decreasing the use of ingredients that are high in refined starches, added sugars, and saturated and trans fats and low in nutrient density. These strategies frequently overlap—for example, increasing the amount of fruit and vegetable ingredients in a menu item may also help to reduce overall fat content.

This chapter first describes three key issues relating to products, menu items, and meals: menu design and cooking techniques; portion size, plate composition, and menu pairing; and beverages. The chapter then sets forth four recommendations, along with specific operational tips for implementing the recommendations.

The recommendations and operational tips were developed with the following assumptions in mind.

- The target audience for this chapter is the foodservice industry, including producers and manufacturers, distributors, and foodservice operators. Because significant differences exist among these various sectors of the industry, the operational tips may not apply to all sectors. In addition, the operational tips provide examples for how to implement the recommendations and should not be considered all-inclusive.
- The scope of opportunity addressed in this chapter is limited to:
  - *products*, defined as ingredients produced by manufacturers or growers and then generally sold to distributors for ultimate use by foodservice operators.
  - *menu items*, defined as products or combinations of products in a recipe as they appear on a menu and that are, therefore, controlled by foodservice operators.

- *meals*, defined as any combination of menu items that are sold to customers either individually or in predetermined combinations.
- *Taste and freshness* must be primary considerations, from the perspective of the foodservice industry, when seeking to fuel increased consumer demand for menu items and meals that will help with weight management. Market research studies have consistently shown that taste and freshness drive consumer demand for more healthful menu items and meals, rather than claims of “low calorie,” “low fat,” or other attributes.<sup>141</sup> Many recommendations and strategies in this chapter are based on the use of fresh fruits and vegetables, which understandably can create some constraints with regard to availability, preparation, and costs. For some foodservice outlets, therefore, it may be more feasible to use frozen or canned products, especially, for example, in cooked, multi-ingredient menu items, sauces, and other preparations in which the difference in flavor and texture will not be discernible.
- Education of those in the foodservice industry is a key component to the successful implementation of many of the recommendations.

Forum participants faced the following challenges and issues in the development of this chapter.

- The tone of the chapter is intended to be user-friendly in order to be embraced and accepted by the target audience, the foodservice industry.
- Although reducing calories is the main focus of this report, some, but not all, Forum participants felt strongly that it would not be responsible to put forward calorie-reduction recommendations that do not take nutrient density into consideration. Therefore, in addition to the focus on reducing calories, the recommendations and implementation strategies herein may refer to “healthful” or “healthier” choices for consumers, which is meant to signify foods that are nutrient-dense as well. In addition, as discussed in Chapter 2 and as recommended by the 2005 *Dietary Guidelines for Americans*,<sup>142</sup> the inclusion of whole grains in menu items and meals is encouraged; however, this topic is not addressed in any detail in this chapter.
- Consumer demand for the products, menu items, and meals suggested must exist already. Alternatively, a strategy for reaching out to the public could be developed, so that changes by industry will be accepted. Consumer demand ultimately drives the marketplace at every level within the foodservice industry, from the manufacturer/grower to the distributor to the operator. As discussed in Chapter 2, commercial and social marketing can help to shape demand.
- Some Forum participants noted the need for healthier children’s menus in both quick-service and casual dining restaurants. Improved children’s menus would include nutrient-dense,

<sup>141</sup> B. Wansink, *Marketing Nutrition: Soy, Functional Foods, Biotechnology, and Obesity* (Champaign, IL: University of Illinois Press, 2005).

<sup>142</sup> U.S. Department of Health and Human Services (HHS) and U.S. Department of Agriculture (USDA), *Dietary Guidelines for Americans 2005* (6th ed.) (Washington, DC: HHS and USDA, 2005). See: [www.health.gov/dietaryguidelines/dga2005/document/html/executivesummary.htm](http://www.health.gov/dietaryguidelines/dga2005/document/html/executivesummary.htm).

lower-calorie food choices, such as items containing fruits and vegetables and no- and low-fat dairy products. The issue of age-appropriate portion sizes also should be addressed in children's menus. In general, the healthier food choices made available to adults should be reflected in children's menus as well.

- Cost and price issues are of major concern. Studies reveal that diets low in calorie density are consistent with eating patterns described as healthy using other nutrient-based criteria.<sup>143</sup> Given the current structure of food prices, however, lowering dietary calorie density by replacing fats and sweets with vegetables and fruits can be associated with higher diet costs.<sup>144</sup> Sugar in any form, for example, is a very inexpensive food ingredient, while water-rich foods such as fresh produce, meats, and dairy products can be costly.<sup>145</sup> Such foods cost more to produce, transport, and store and have a shorter shelf life (leading to more spoilage) than dry grains, added sugars, and added fats.<sup>146</sup> As a result, many of the recommendations and operational tips included in this chapter will involve additional cost to the foodservice industry, in terms of both the cost of the products and the cost of operations. It is not clear that industry will be able to pass on all of these additional costs to all consumer segments—especially those at greatest risk for obesity and diabetes—thus making implementation of these recommendations challenging.

## Overview of the Issues

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The recommendations at the end of this chapter were framed around three central issues: menu design and cooking techniques; portion size, plate composition, and menu pairing; and beverages. Each of these issues presents opportunities for making changes in the away-from-home foods market.

## Menu Design and Cooking Techniques

Traditionally, many households ate away from home for reasons of celebration, and they viewed the occasions as special opportunities for indulgence. As a result, foodservice industry systems—including cooking techniques, menu choices, equipment, and operational set-ups—were designed with that focus in mind. Also, when meals were consumed away from home relatively infrequently, their impact on caloric intake was less significant.

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<sup>143</sup> S. Klein, et al., "Weight Management through Lifestyle Modification for the Prevention and Management of Type 2 Diabetes: Rationale and Strategies," a statement of the American Diabetes Association, the North American Association for the Study of Obesity, and the American Society for Clinical Nutrition, *American Journal of Clinical Nutrition* 80 (2004): 257-263; and J.H. Ledikwe, et al., "Food Patterns and Diet Quality of U.S. Adults with a Low-Energy-Dense Diet," *Journal of the American Dietetic Association*, in press.

<sup>144</sup> N. Darmon, A. Briand, and A. Drewnowski, "Energy-Dense Diets Are Associated with Lower Diet Costs: A Community Study of French Adults," *Public Health Nutrition* 7 (2004): 21-27.

<sup>145</sup> A. Drewnowski and S.E. Specter, "Poverty and Obesity: The Role of Energy Density and Energy Costs," *American Journal of Clinical Nutrition* 79 (2004): 6-16.

<sup>146</sup> B. Rolls, A. Drewnowski, and J. Ledikwe, "Changing the Energy Density of the Diet as a Strategy for Weight Management," *Journal of the American Dietetic Association* 105 (2005): S98-S103.

Now, however, the trend toward eating away-from-home foods is steadily increasing; the average consumer now eats 4.2 meals (or approximately 20% of all meals, based on 21 meals per week) outside the home per week, up from 3.9 per week in 1985.<sup>147</sup> (The change is attributable to an increase in take-away foods; Americans are actually eating at restaurants less frequently—93 meals in 1985 versus 80 meals in 2005.)<sup>148</sup> This shift in consumers' lifestyles creates an opportunity for industry to modify its practices. This is not to say that the occasional indulgent meal should be eliminated from menus; however, to combat obesity, menu designs and routine cooking methods need to shift toward approaches that yield a greater percentage of healthier, lower-calorie, and less-calorie-dense menu choices.

By providing customers with new and/or reformulated menu items and meals of lower calorie density, restaurant and foodservice operators will help customers manage their energy balance. Studies show, for example, that consumers may not notice a 25% decrease in calorie density for many foods, and the change may have little effect on palatability.<sup>149</sup> The addition of water-rich foods along with even modest decreases in fat content could reduce the calorie density of many popular foods, such as burgers, pizza, and sandwiches. With such reductions in calorie density, consumers are likely to ingest the same amount of food, but fewer calories, while feeling just as full and satisfied.<sup>150</sup> (It is important to note, however, that the studies on which these statements are based were done in a laboratory setting; therefore it is difficult to discern what consumer acceptance would be in a more natural setting.) Two of the methods by which foodservice operators can reduce the calorie density of new or reformulated menu items and meals are as follows.

- Substituting less-calorie-dense versions of ingredients and products for their more-calorie-dense counterparts (e.g., substituting leaner meat or lower-fat cheese for the full-fat versions).
- Increasing the volume of fruits and vegetables in, and lowering the calorie density of, both individual items (e.g., by adding grated vegetables to meat dishes) and meals (e.g., by increasing the proportion of fruits and vegetables on the plate).

The ability to provide such menu items and meals, of course, is sometimes limited by operational realities. Foodservice operators can identify numerous obstacles that inhibit synergy among producers/manufacturers, distributors, and operators, and that ultimately restrict operators' ability to easily purchase and use the products needed to produce new or reformulated menu items and meals.

<sup>147</sup> R. Ebbin, "Americans' Dining Out Habits," *Restaurants USA*, November 2000. See [www.restaurant.org/rusa/magArticle.cfm?ArticleID=138](http://www.restaurant.org/rusa/magArticle.cfm?ArticleID=138).

<sup>148</sup> Harry Balzer, The NPD Group, *Eating Patterns in America*, presentation given February 1, 2006.

<sup>149</sup> B. Rolls, L. Roe, and J. Meengs, "Reductions in Portion Size and Energy Density of Foods Are Additive and Lead to Sustained Decreases in Energy Intake," *American Journal of Clinical Nutrition* 83 (2006): 11-7.

<sup>150</sup> Ibid. Also, B. Rolls, A. Drewnowski, and J. Ledikwe, "Changing the Energy Density of the Diet," 2005.



## Portion Size, Plate Composition, and Menu Pairing

As discussed in the introduction to this report, obesity rates in the United States have increased dramatically over the past 30 years. During that same period, steady and significant increases have been documented in the portion sizes of foods consumed away from home, the number of away-from-home meals Americans are consuming, and Americans' overall calorie intake.<sup>151</sup> Other factors may also have affected obesity rates during this time, including reduced physical activity, the trend for most households to be engaged in the workforce for pay and not have a full-time homemaker, an increase in the number of hours worked, and an increase in the number of single-person households.<sup>152</sup>

Larger portions are common for many foods with a high calorie density, and while a causative link between large portions of calorie-dense foods and obesity remains unproven, the available data support such a link. Indeed, it has been shown that energy intake increases with bigger portions of a variety of types of foods, including those served in distinct units, such as sandwiches<sup>153</sup> and potato chips,<sup>154</sup> and those not served in distinct units, such as macaroni.<sup>155</sup> The size of portions served in restaurants also affects calorie intake; one study found, for example, that when the size of a popular pasta dish was increased by 50%, customers ate 43% more of that dish.<sup>156</sup> Survey data from the American Institute for Cancer Research indicate that many people let the foodservice provider determine an appropriate portion and eat accordingly, so that the bigger the portion, the more they consume.<sup>157</sup>

As discussed in Chapter 2, a possible strategy for moderating the effects of portion size on calorie intake is to combine small decreases in portion size with moderate reductions in calorie density. In a recent study, when both the calorie density and portion size were reduced by 25% over two days, study participants showed a decrease in calorie intake of 812 calories per day.<sup>158</sup>

Large portions are not associated with increased calorie intake in those cases where the food in question is low in calorie density. Studies show that consumption at the start of a meal of a low-

<sup>151</sup> L.R. Young and M. Nestle, "The Contribution of Expanding Portion Sizes to the U.S. Obesity Epidemic," *American Journal of Public Health* 92, no. 2 (2002): 246-249; L.J. Harnack, R.W. Jeffery, and K.N. Boutelle, "Temporal Trends in Energy Intake in the United States: An Ecologic Perspective," *American Journal of Clinical Nutrition* 71 (2000): 1478-1484; and J.J. Ledikwe, J. Ello-Martin, and B. Rolls, "Portion Size and the Obesity Epidemic," *Journal of Nutrition* 135 (2005): 905-909.

<sup>152</sup> H. Stewart, et al., *The Demand for Food Away from Home: Full-Service or Fast Food?* Agricultural Economic Report #829 (Washington, DC: USDA, 2004).

<sup>153</sup> B. Rolls, et al., "Increasing the Portion Size of a Sandwich Increases Energy Intake," *Journal of the American Dietetic Association* 104 (2004): 367-372.

<sup>154</sup> B. Rolls, et al., "Increasing the Portion Size of a Packaged Snack Increases Energy Intake in Men and Women," *Appetite* 42 (2004): 63-69.

<sup>155</sup> B. Rolls, E. Morris, and L. Roe, "Portion Size of Food Affects Energy Intake in Normal-Weight and Overweight Men and Women," *American Journal of Clinical Nutrition* 76 (2002): 1207-1213.

<sup>156</sup> N. Diliberti, et al., "Increased Portion Size Leads to Increased Energy Intake in a Restaurant Meal," *Obesity Research* 12 (2004): 562-568.

<sup>157</sup> B. Rolls, "The Supersizing of America: Portion Size and the Obesity Epidemic," *Nutrition Today* 38 (2003): 42-53; and American Institute for Cancer Research, *Awareness and Action: AICR Surveys on Portion Size, Nutrition, and Cancer Risk* (Washington, DC: AICR, 2003). See [www.aicr.org/site/DocServer/awarenessandaction\\_03conf.pdf?docID=106](http://www.aicr.org/site/DocServer/awarenessandaction_03conf.pdf?docID=106).

<sup>158</sup> B. Rolls, L. Roe, and J. Meengs, "Reductions in Portion Size and Energy Density," 2006.

calorie-dense food such as soup<sup>159</sup> or salad<sup>160</sup> actually decreases overall energy intake. This approach of eating low-calorie-dense food at the start of a meal may be an effective strategy for weight management, although it should be noted that it could also raise costs for consumers.

## Beverages

Major consumer behavior changes have occurred in the past several years coincident with the obesity epidemic. One such change is an increase in the consumption of sugar-sweetened beverages, which is linked to higher calorie intake and a higher risk for obesity in some but not all studies.<sup>161</sup> A recent study showed that the consumption of caloric beverages (e.g., sugar-sweetened soft drinks, 100% juices, and 1% milk) in contrast to non-caloric beverages (e.g., water or diet soft drinks) with a meal, added calories to the meal without impacting the subject's sense of fullness.<sup>162</sup> Similar results were obtained when caloric beverages were consumed two hours before the meal.<sup>163</sup> It would appear that consuming caloric beverages as opposed to water or other non-caloric beverages is likely to contribute to an excess consumption of calories.

Advice to limit sweetened caloric beverage consumption is consistent with the Dietary Guidelines, which advise consumers to "choose and prepare foods and beverages with little added sugars or caloric sweeteners."<sup>164</sup> That said, Forum participants recognize that the development of obesity involves several dietary factors,<sup>165</sup> and one of those factors is excess caloric intake. A decrease in caloric beverage consumption is just one of many necessary strategies in the effort to reduce obesity.

Soft drinks, which include soda, iced tea, sugary fruit drinks, and other sweetened beverages, are the largest single source of calories in the American diet.<sup>166</sup> As soft drink consumption has increased, so have typical portions available for consumption. In the 1950s, for example, the standard serving size for soft drinks was 6½ ounces. We now have a multitude of choices, including 12-ounce cans and increasingly popular 20-ounce bottles. In addition, fountain sodas of 32 and even 64 ounces are available in many venues. The larger the container, the more soda consumers are likely to drink, particularly when buying single-serving containers.<sup>167</sup> The

<sup>159</sup> B. Rolls, E.A. Bell, and M.L. Thorwart, "Water Incorporated into a Food but Not Served with a Food Decreases Energy Intake in Lean Women," *American Journal of Clinical Nutrition*, 70 (1999): 448-455.

<sup>160</sup> B. Rolls, L. Roe, J. Meengs, "Salad and Satiety: Energy Density and Portion Size of a First-Course Salad Affect Energy Intake at Lunch," *Journal of the American Dietetic Association* 104 (2004): 1570-1576.

<sup>161</sup> R.A. Forshee and M.L. Storey, "Total Beverage Consumption and Beverage Choices among Children and Adolescents," *International Journal of Food Science and Nutrition* 54, no. 4 (2003): 297-307.

<sup>162</sup> D. DellaValle, L. Roe, and B. Rolls, "Does the Consumption of Caloric and Non-Caloric Beverages with a Meal Affect Energy Intake?" *Appetite* 44 (2005): 187-193.

<sup>163</sup> E. Almiron-Roig and A. Drewnowski, "Hunger, Thirst, and Energy Intakes following Consumption of Caloric Beverages," *Physiology and Behavior* 79, no. 4-5 (2003): 767-73.

<sup>164</sup> HHS and USDA, *Dietary Guidelines for Americans*, 2005.

<sup>165</sup> American Beverage Association, "Obesity," [www.ameribev.org/health/obesity.asp](http://www.ameribev.org/health/obesity.asp), accessed January 25, 2005.

<sup>166</sup> R.P. Troiano, et al., "Energy and Fat Intakes of Children and Adolescents in the United States: Data from the National Health and Nutrition Examination Surveys," *American Journal of Clinical Nutrition* 72 (supp.) (2000): 343S-353S.

<sup>167</sup> B. Wansink and K. van Ittersum, "Bottoms Up! The Influence of Elongation and Pouring on Consumption Volume," *Journal of Consumer Research* 30, no. 3 (2003): 455-463.

introduction of self-serve beverage fountains and free refills may also be having an impact. (It is important to realize, however, that these latter developments are intentional positioning strategies for some restaurants and are an important part of their value proposition to consumers.<sup>168</sup>) Pricing practices also encourage people to drink large servings, as larger portions typically cost less per ounce.<sup>169</sup>

It is also worth mentioning that some specialty beverages, including flavored lattes and milkshakes, often deliver more sugar than do soft drinks. Their calorie content can be unexpectedly high, reaching up to 800 calories per 20-ounce portion. And as with soft drinks, a multitude of size choices are now available, with 16-ounce and 20-ounce lattes and cappuccinos more the norm than the exception. Thus the fat and sugar content of traditionally calorie-free coffee bears watching, as does its potential impact on the development of obesity. Also, as noted in the 2005 Dietary Guidelines, alcoholic beverages supply calories but few essential nutrients, and the caloric content of these beverages can vary widely depending on the volume of the drink, the types of mixers used, and other ingredients used. The Guidelines address issues related to moderate and excess alcohol intake, which were not a subject of discussion by the Forum nor a focus of its proposed recommendations.<sup>170</sup>

## **The Forum's Recommendations and "Operational Tips"**

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Forum participants in this section offer four recommendations and numerous operational tips for the consideration of the foodservice industry.

### **Recommendation 3.1**

*Promote the wider inclusion in foodservice of less-calorie-dense menu items and calorie-sparing cooking techniques that are widely accepted by consumers and that take into account constraints on operators.*

#### **Operational Tips for Recommendation 3.1**

- 1) Culinary educational facilities should provide chefs and foodservice operators with the necessary education, resources, and skills to produce menu choices that will help customers achieve and maintain a healthy weight. Specifically, it is suggested that they do the following.
  - Provide instructional programs to help chefs and restaurateurs develop a solid understanding of (1) the science behind providing food choices that support healthy weight, (2) caloric density, and (3) the principles behind low-calorie-dense food selection and preparation.

<sup>168</sup> B. Wansink and M. Huckabee "De-Marketing Obesity," *California Management Review* 47, no. 4 (2005): 6-18.

<sup>169</sup> National Alliance for Nutrition and Activity (NANA), *From Wallet to Waistline: The Hidden Costs of Super Sizing* (Washington, DC: NANA, 2002).

<sup>170</sup> HHS and USDA, *Dietary Guidelines for Americans*, 2005.

- Provide educational programs that illustrate how to develop less-calorie-dense menu items. For example:
    - Encourage the use of fruit- and vegetable-based sauces in place of high-calorie-dense sauces.
    - Emphasize the moderate use of healthy (i.e., unsaturated) fats, which should be added to a product where they will have the greatest impact on flavor.
    - Encourage the use of fruit-based desserts in place of butter- and cream-based, high-sugar preparations.
  - Provide educational programs to help chefs and restaurateurs overcome the perception that healthy menu items lack creativity and flavor. The following are examples of strategies that optimize flavor, taste, and customer appeal.
    - Highlight peak-of-flavor seasonal produce.
    - Explore a variety of world cuisines for inspiration regarding healthy cooking and menu design—specifically, cuisines that are largely plant-based and include innovative ways to enhance flavor and present produce-centered preparations.
    - Highlight the use of high-flavor, low-calorie-dense ingredients such as fresh herbs and spices.
  - Encourage chefs and restaurateurs to offer more lower-calorie choices on children's menus. Encourage them to:
    - Consider children's menus to be an extension of the regular menu.
    - Offer more fruits and vegetables on the children's menu.
    - Offer appropriate portion sizes of children's meals.
    - Make lower-calorie beverages the default option with children's meals.
    - Direct this strategy at culinary leaders in the multi-unit sector, who are in the best position to innovate in this part of their menu.
  - Include food distributors in discussions about how to implement this recommendation.
- 2) To help promote the educational priorities described above, appropriate government agencies should:
- in conjunction with industry, support initial educational and leadership efforts as follows.
    - Convene roundtable discussions at various trade and professional conferences and culinary schools, to engage foodservice operators and chefs in a dialogue about creative ways to offer flavorful and healthier menu items.
    - Convene a "speakers series" in which renowned experts present the findings and recommendations from this report at various trade and professional conferences.
  - Provide grants to help culinary schools develop curricula or other resource materials that reflect the current consensus within the scientific community about cooking methods and approaches that help consumers achieve and maintain a healthy weight.
    - Work to raise awareness within the industry about the need for foodservice operators to be educated about healthy cooking techniques.

- 3) The synergy between producers/manufacturers, distributors, and operators should be enhanced, in order to facilitate the purchase and use of the products that are needed to produce new or reformulated menu items and meals, to help consumers manage their energy intake.
- Industry leaders, distributors, and other appropriate individuals should initiate conversations with growers regarding opportunities for increased production of the most commonly used fruits and vegetables.
  - Industry leaders and appropriate government agencies should encourage manufacturers to develop and promote alternative produce packaging—such as cryovac, sous vide, aseptic, and ready-to-cook packaging—which requires less refrigerator/freezer storage and less preparation time and skill, and improves the sensory quality of the produce (compared to standard freezing and canning methods).
  - Industry leaders and appropriate government agencies should encourage manufacturers to offer foodservice-size packaging for products such as evaporated fat-free milk, lower-fat cheeses, and pre-cut vegetables, all of which can be used to make less-calorie-dense menu items.
  - Large purchasers and purchasing consortiums, which have the power to influence distribution methods, should:
    - provide incentives to distributors to offer split cases, small quantities (by the piece), and more frequent deliveries for operators with small volume and/or limited storage.
    - provide incentives to distributors to offer partially prepared produce (cleaned, peeled, cut), as well as low-fat and nonfat dairy products.
    - promote a reasonable, but not excessive, price premium for those services requiring substantial additional labor, assuming that consumer demand will permit the premium.
  - In appropriate foodservice settings, operators should train employees to clean, peel, and cut fresh produce.
  - In appropriate foodservice settings, operators should train employees to ask produce vendors and distributors for advice on the “best buys” in terms of flavor, seasonality, and price.
  - Operators should purchase fruits and vegetables in season when possible.
  - Operators, including those who operate quick-service and fast-casual restaurants, are encouraged to use fruit- and vegetable-based “limited time offers,” such as pumpkin specials in the fall and cranberry specials in the winter.
  - Operators should patronize vendors and distributors that will provide them with split cases, more frequent delivery, pre-prepared fruits and vegetables, lean meats, and low-fat and nonfat dairy products.

- Operators should increase their usage of fruits, vegetables, and other products, such as low-fat and nonfat milk and cheese or lean meats, in order to reduce the calorie density of their menu items and meals by a mutually agreed upon percentage.
- The U.S. Department of Agriculture or other appropriate entities should be urged to compare the forecasted demand for fruits and vegetables with actual production levels, and then promote opportunities where an excess supply exists.

### **Funding Approaches**

Funding to implement this recommendation could come from a variety of sources, including governments, foundations, corporations, and associations. Ideally, appropriate government agencies would first fund leadership programs (i.e., “train the trainer” programs) to stimulate initial activity and create awareness of shared long-term industry goals. Costs are difficult to predict, but the focus should be on funding the development of educational resource materials for the foodservice industry, as well as pilot programs to demonstrate success.

### **Recommendation 3.2**

*Foodservice providers should develop and promote portion-size, plate composition, and menu-pairing options that help consumers in their efforts to manage their energy intake.*

#### **Operational Tips for Recommendation 3.2**

The following implementation strategies are geared toward chefs, menu developers, servers, and customers.

- 1) Reduce total calories in mixed dishes by combining moderate reductions in calorie density with changes in portion size.
  - Bundle menu items or retool the plate to increase or add portions of fruit and vegetables. Some suggest re-portioning the plate so that four key elements—the main dish, fruits, vegetables, and whole grains—each make up one-quarter of the plate.
  - Use small amounts of fish, lean meat, poultry, nuts, legumes, and/or eggs to create “center-of-the-plate” entrees that are largely plant-based (though not necessarily vegetarian).
- 2) Retool menu items to provide less-calorie-dense choices.
  - Offer lower-calorie condiments, such as mustard, salsa, and full-flavor sauces.
  - Decrease the portion size of calorie-dense spreads and protein sandwich fillings (e.g., tuna salads, chicken salads, etc.).
  - Offer half portions.
  - Offer sandwich alternatives, such as lettuce wraps.

- Where it would not compromise taste, use reduced-calorie or reduced-fat ingredients, such as mayonnaise, cheese, milk, and leaner meats, or use smaller amounts of the calorie-dense ingredients.
  - Offer salads with the “extras” on the side (e.g., croutons, bacon bits, cheese, salad dressing).
  - Prepare vegetables, fish, and other menu items using more-healthy cooking techniques (e.g., steaming, baking, and grilling), and top them with nutrient-dense, low-calorie sauces and flavor enhancers rather than traditional, calorie-dense sauces.
  - Increase opportunities for customers to customize their meals with less-calorie-dense options.
- 3) For sandwiches, offer more fruit and/or vegetable options than just lettuce and tomato. For example, offer roasted red peppers, roasted eggplant, cucumbers, etc.
  - 4) Provide more options and promote (i.e., “suggestive sell”) meal bundles with fruits and vegetables (including salads), while maintaining traditional side options as well.
    - Focus on providing more age-appropriate options for children’s meals, including more fruits and vegetables. Also, include low-fat and/or fat-free milk in bundled meals for children.
  - 5) Develop and promote appropriately sized “sampler” plates of bite-sized appetizers and desserts (including a combination of indulgent and healthier options) to be shared, with the goal of thereby reducing the total calorie intake of one’s overall meal.
  - 6) Offer several portion sizes of each menu item.
  - 7) Feature ethnic cuisines that inherently encourage small portions, such as tapas, mezze, and dim sum.
  - 8) Adopt approaches to support portion-size reduction and/or curtail emphasis on “bigger means better” messages. For example:
    - Industry could refrain from using value marketing to promote larger portion sizes. Value messages based on “a large amount of food for a fixed price” could be replaced with value messages based on a “small portion of food for a *lower* price.” The large size could still be made available if desired.
    - Government, industry, and health groups should conduct joint social marketing campaigns to help people understand appropriate portion sizes for their calorie needs.

### **Cost Considerations**

Smaller portion sizes do not necessarily equate to lower costs, especially if menu items are made more healthy through the addition of fruits and vegetables. Increased costs to execute the above strategies might include food, labor, research and development, and marketing costs, which would be incurred by foodservice operators and most likely passed on to consumers. Some consumers may be willing and able to pay a higher price for these options, but some may be unable or unwilling. Some of these costs (especially for research and development) could be



minimized if they were shared among government agencies, health groups, and industry. As discussed in Chapter 2, marketing and education initiatives are needed to promote the value of these changes to consumers.

### **Recommendation 3.3**

*Foodservice providers should develop, make available, and promote beverage options that help consumers to reduce calorie intake.*

#### **Operational Tips for Recommendation 3.3**

Industry leaders should do the following.

- 1) Increase the range of low-calorie or zero-calorie beverage choices available to consumers and provide smaller portion sizes (e.g., 10-fluid-ounce sizes, 100-calorie servings, etc.)
  - Where fountain drinks are self-served, provide a wider variety of selections, such as unsweetened flavored waters or seltzer, light or no-calorie lemonade or fruit drinks, unsweetened and/or non-caloric sweetened iced teas, diet colas, and diet non-cola sodas.
  - When serving bottled beverages, a similar range of options should be included, in addition to water.
- 2) Increase the selection of low-fat or nonfat milk beverages. Although the calories in nonfat milk are equivalent to the calories in sodas and juices, milk provides important nutrients that are lacking in many Americans' diets.<sup>171</sup>
  - Fat-free and 1% milk should be readily available, especially with children's meals.
  - Organizations and government agencies should collaborate on campaigns to encourage low-fat milk consumption and on strategies to close the gap between current consumption levels and the intake levels recommended in the 2005 Dietary Guidelines. A number of communities have conducted "1% Or Less" campaigns, which have resulted in significant increases in low-fat milk sales and consumption.
- 3) In specialty venues such as coffee shops, offer lower-calorie selections and smaller portion sizes of specialty and frozen drinks, in addition to the standard versions.
  - Where this is already occurring, it would be helpful to compile data on product performance.
- 4) Expand the range of beverage options available to consumers to include a wider array of cup and bottle sizes.
- 5) Consider pricing approaches that make smaller sizes and lower-calorie options more appealing.

<sup>171</sup> C.S. Berkey, et al., "Sugar-Added Beverages and Adolescent Weight Change," *Obesity Research* 12, no. 5 (2004): 778-788.

- 6) For bundled meals, offer lower-calorie beverage options, such as water, and encourage reasonable portion sizes.

### **Recommendation 3.4**

*Industry and academia should conduct—collaboratively, if possible—research on the topics and questions listed below. In addition, a specific scientific survey should be conducted about the experiences of operators and restaurateurs in developing menu items that could aid in weight management.*

Many of the recommendations above that are geared toward industry are not based on empirical research. As a result, researchers in industry and/or academia should make an effort to validate these recommendations. In so doing, a collaborative effort between these entities would be beneficial to the field. One goal of such a collaborative effort should be to assess the effectiveness of each proposed strategy in restaurant and institutional settings. Strategic partnerships between the scientists conducting the research and the restaurateurs providing the real-world laboratory could help to close the knowledge gaps that currently exist. Some of these knowledge gaps are identified below, followed by information about a preliminary survey that was developed to gather more information about the experiences of operators and restaurateurs in developing menu items that could aid weight management.

### **Basic Research Needs**

The following suggestions focus on research as it relates to the foodservice industry (as opposed to the consumer). They address basic research needs as well as suggestions for the development of specific, scientifically sound strategies that will lead to a better informed public, industry, and academic community. The proposed research will hopefully lead to a fuller body of knowledge that will support and encourage additional changes in products, menus, and meal items to address the problem of overweight and obesity.

Basic research needs and questions are categorized into four topics below: calorie density and portion size; increasing fruits and vegetables; product formulation; and packaging and marketing.

#### **1) Calorie Density and Portion Size**

- What is the relationship between calorie intake, portion size, and satiety in the long term?
- Can portion sizes be made to more accurately reflect calorie needs, while continuing to deliver acceptable value and an equal level of acceptance by consumers?
- Is it feasible to reformulate popular menu items to decrease calorie density while maintaining price or preserving, or even increasing, market share?
- How can reductions in portion size and calorie density be combined to help consumers reduce calorie intake?
- Can shifts in menu offerings be made to reflect the appropriate balance of foods (i.e., as recommended by the Dietary Guidelines<sup>172</sup>)?

<sup>172</sup> HHS and USDA, *Dietary Guidelines for Americans*, 2005.

## 2) Increasing Fruits and Vegetables

- Do individuals who consume the amount of produce recommended in the Dietary Guidelines tend to have a healthier weight?
- What costs are associated with re-portioning the plate to include a greater volume of fruits and vegetables in a meal, and under what conditions will those costs be accepted by the consumer?
- What fruit and vegetable options are “desirable” in the away-from-home foods market—both in terms of those that consumers will select and those that help to reduce calorie intake? The answers to this question might differ for various sectors (e.g., quick service, fast casual, fine dining).
- Based on a hypothetical target increase for fruit and vegetable consumption in restaurants, develop a forecasting tool to help predict potential demand for the ten most commonly used fruits and vegetables. Utilize this information to help industry become better equipped to reach the target.

The following five recommendations were taken from the Produce for Better Health National Action Plan.<sup>173</sup> Forum participants considered them to be relevant to the purposes of this report and therefore have reiterated them here.

- Fund agricultural research initiatives that address convenience, taste, versatility, and longer-term product quality issues (from farm to table) regarding fruits and vegetables.
- Support increased research into the role of fruits and vegetables in weight management (including preparation techniques, when and how fruits and vegetables are consumed, and satiety functions).
- Support increased emphasis on fruit and vegetable research that focuses on increasing consumer consumption.
- Develop measurement and impact tools to evaluate the effectiveness of various fruit and vegetable consumer marketing initiatives.
- Support studies of the relative roles various factors play in fruit and vegetable consumption among children and adults—availability, price, education, type of produce, type of other foods offered, age, parental involvement, and media messages.

## 3) Product Formulation

- How would operations and product pricing be affected by the recommended product formulation changes in menu items, and how would this affect the cost to the consumer?
- What attributes of “healthy” products (e.g., lower sodium or fat, flavor, characteristics unrelated to their healthfulness, price, freshness, general quality, etc.) cause them to fail? Can any generalizations be made, or does each product need to be considered on a case-by-case basis?
- If presented with a wider variety of healthy choices, what decisions will consumers make? And do those decisions have an impact on weight management? (For example, will consumers choose lower-fat cheese on sandwiches, no cheese on salads, low-calorie dressings, low-calorie beverage options, etc.?)

<sup>173</sup> Produce for Better Health Foundation, *National Action Plan to Promote Health through Increased Fruit and Vegetable Consumption* (Wilmington, DE: Produce for Better Health Foundation, 2005).

- What changes in children's menus will impact pediatric overweight and obesity? These changes might include: smaller portion sizes and offering more fruits, vegetables, low-fat dairy products, leaner meats, and lower-calorie beverages.
- Can the history of successes and failures in terms of recent initiatives (over the past two years) by foodservice establishments provide valuable insight into new product offerings or reformulations?

#### 4) Packaging and Marketing

- What information do consumers either lack or need in order to make informed decisions at the point of consumption?
- Would it be useful to encourage restaurants to promote the use of "to go" containers with meals so that consumers eat less in one sitting?
- Are commercial sizes of lower-calorie products (e.g., low-fat cheese, fat-free evaporated milk, etc.) available in sufficient quantity and variety?
- What information, if any, regarding the nutritional composition of menu items prompts consumers to take action and choose items to manage weight?

### Scientific Survey

Keystone Forum participants conducted an informal survey to gather information from chefs and restaurant owners about their experiences helping customers to manage their weight and health, particularly via product reformulation and innovation. The purpose of this unscientific, preliminary survey was to better understand the current thinking in the food industry on these topics. The group hoped to identify some additional recommendations through this exercise. Based on the narrow range of results, however, in which 92 of the 111 responses were from the on-site/contract-feeding sector, participants were not comfortable putting forth concrete recommendations based on these responses.

Forum participants did, however, see promise in these preliminary results and therefore recommend that a scientific survey be conducted after the conclusion of the Forum. Collecting such information from chefs, restaurant owners, managers, and others across the spectrum of industry sectors, as well as researchers and public policy officials, will further public understanding of what changes the restaurant industry might be encouraged to undertake in the future. This type of information could provide guidance to the industry on how to develop menu items that will help consumers manage their weight.

Appendix G contains information about the results of the informal study.